Fortress



Germany's West Wall

The Siegfried Line

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Introduction

Since time immemorial attempts have been made to fortify the present-day Franco-German border. The Romans built a series of defences to prevent the German hordes from invading Gaul[1] (modern-day France) and this trend continued from ancient to modern times. In the 19th century the French built a defensive curtain to protect their frontier, with perhaps the most famous feature being the forts at Verdun. In the 20th century these fortifications reached their zenith with the construction of the Maginot Line, a system of fortifications that stretched the entire length of the border with Germany.

Of course, it is easy to forget that for a long time Germany was not the aggressor but the aggrieved. After Napoleon's campaigns in the early part of the 19th century the states of Germany built fortifications along the Rhine river to prevent future French aggression. Major cities, including Koblenz, Cologne and Mainz, were heavily fortified and the defences of Ingolstadt and Ulm, always very strong, were modernised and extended. After the Franco-Prussian War of 1870–71, the Germans sought to secure the gains they had made at the expense of France by building some of the most advanced fortifications of their time around Metz, Strasbourg and Thionville.

By the turn of the century it seemed that the value of permanent fortifications was in decline. Fieldworks with wire entanglements and covered by machine guns had proved their value in the Russo-Japanese War of 1904, and military theorists began to revise the military textbooks. Yet the German plans for the invasion of France in 1914 (the so-called Schlieffen Plan) were heavily influenced by the desire to avoid a frontal attack on the traditional French fortresses that studded the border. As a consequence German strategists decided to attack through Belgium, but this vast encircling manoeuvre ran out of steam and the fighting deteriorated into a bloody stalemate, nowhere more so than around the forts of Verdun. This battle of attrition demonstrated to the French military the value of permanent fortifications and heavily influenced military thinking in the post-war years, leading directly to the building of the Maginot Line which it was hoped would prevent another German invasion.

The Germans, by contrast, drew their own, very different, conclusions from the fighting of World War I, developing the idea of defence in depth established by Colonel Fritz von Lossberg. He argued that by constructing a series of defensive zones, each one stronger than the last, it would be possible to weaken and isolate the enemy attackers and leave them vulnerable to counter-attack. His ideas were employed in the construction of the *Siegfriedstellung* – literally Siegfried Line or position. This was the first of a number of defensive lines constructed by the Germans in World War I that were named after figures in German mythology.

The Hindenburg Line, as the Allies loosely referred to these defensive lines, was particularly successful and it was not until relatively late in the war, with the arrival of fresh American troops and with Germany crippled by four years of conflict, that the line was pierced. Clearly, von Lossberg's concept had some merit but in the dark days following the German armistice and ultimate surrender it was unclear when, if ever, his ideas might be used again.

This impression was reinforced in 1919 with the signing of the Treaty of Versailles. The political and military clauses of the settlement emasculated the German armed forces and prohibited the German government from stationing troops in the Rhineland; and, to heap further ignominy on the once mighty imperial power, Allied troops occupied the border zone. This army of occupation, together with specialist control commissions, ensured that the provisions of the peace treaty were adhered to, not least of which was the dismantling of all fortified positions along the border with France and the prohibition of further construction in the Rhineland.

1 In the first century AD the Roman legions built *Limes* or 'threshold' fortifications to safeguard the frontiers of their territories. Hitler later adopted this term as the title for his expansion of the West Wall – the so-called *Limesprogramm*.



The Siegfried Line of the First World War was markedly different to its later, more famous namesake. This section of the line near Honnecourt taken in August 1917 shows that it was little more than an elaborate trench system. (Imperial War Museum)

Beaten but unbowed, Germany, under the fledgling democracy of the Weimar Republic, slowly recovered. This both pleased and worried the western democracies in equal measure. A strong Germany would act as a bulwark against Bolshevism and provide lucrative markets for exports, but equally a strong Germany might once again threaten the peace of Europe. As such, Germany's neighbours sought sanctuary in a series of alliances of mutual support and by building a series of fortifications, the most significant of which was the much-vaunted Maginot Line.

Inside Germany these actions were viewed with dismay and were seized upon by political extremists at a time when the effects of the Great Depression were buffeting the economy and the new democratic government. Support for left and right-wing parties grew and in 1933 Adolf Hitler, leader of the far-right National Socialist German Workers Party, was made Chancellor of Germany. Soon after his accession to power, Hitler challenged the terms of the Treaty of Versailles by introducing conscription and establishing an air force, both prohibited under the terms of the peace settlement. Unchecked, the self-styled Führer, as he now dubbed himself, sent troops into the Rhineland. The western powers condemned these actions, but did nothing. The way was now clear for Germany to fortify her western border.

The defences, known as the West Wall (*Westwall* in German), were built in stages and eventually stretched the entire length of Germany's western border. They generally followed the political boundary, but with special emphasis placed on defending the historic avenues of attack. Particularly strong were the defences around Aachen, which not only protected this symbolically important city, the birthplace of Charlemagne, but also blocked the so-called Aachen gap, which led to Germany's industrial heart in the Ruhr. To the south the defences of the Saarland, where Germany shared a common border with France, and which was the location of the strategically important Saar Basin, were, if anything, even stronger.

NETHERLANDS
BELGIUM
LUXEMBOURG
GERMANY
FRANCE
SWITZERLAND
Goch
Aachen
Köln
Bonn
Koblenz
Kassel
Frankfurt
Bitburg
Trier
Saarbrücken
Pirmasens
Mannheim
Karlsruhe
Stuttgart
Strasbourg
Colmar
Freiburg
Mulhouse
Maas
Lippe
Ruhr
Weser
Fulda
Werra
Rur
Sieg
Rhein
Lahn
Mosel
Nahe
Main
Tauber
Saar
Enz
Neckar
Donau
Wetterau-Main-Tauber Stellung
Neckar-Enz Stellung
N
Siegfried Line
Luftverteidigungszone
B-Werke showing number of forts
17cm battery
24cm battery
30.5cm battery
International boundary
0 25 miles
0 50 km

Map of the West Wall showing the main defences, the *Luftverteidigungszone* (West), and the Neckar – Enz and Wetterau – Main – Tauber Stellungs.



Unlike its antecedents, the West Wall was built not to protect against French aggression per se but to deter France from attacking in support of her Allies when Hitler sought to realise his territorial ambitions in the east. Built in depth, the defences were designed to slow the enemy's advance. This would allow the bulk of German forces, engaged in what was hoped would be a series of short, sharp campaigns of conquest in the east, time to move to the west to defeat the armies of the western democracies, thus solving the eternal German dilemma of fighting on two fronts.

German soldiers prepare the ground for the first positions of the West Wall near Pirmasens. Lacking heavy digging equipment much of the work had to be done by hand. To the rear screening has been erected which was used to obscure the enemy's view of the building work. (Imperial War Museum)

Chronology

1919 **January** The victorious powers meet at Versailles.
1927 **January** The Allied Control Commissions are withdrawn.
1929 Work on the Maginot Line begins.
1930 The Allied army of occupation is removed.
1933 **30 January** Hitler becomes Chancellor of Germany.
1934 **19 August** Hitler becomes head of state on the death of Hindenburg.
Building work commences on the Neckar-Enz line.
1935 **1 March** The Saar is returned to Germany.
Building work commences on the Wetterau-Main-Tauber line.
1936 **22 February** An order is issued for the secret reconnaissance of the demilitarised zone of the Rhineland.
7 March Germany remilitarises the Rhineland.
1937 Difficulties with raw materials and delivery schedules lead to a lengthening of the forecast building time of the West Wall to 1948 and finally 1952.
1938 **March** The West Wall is extended and strengthened.
11 March Germany annexes Austria.
28 May Hitler orders the accelerated construction of the West Wall with 11,800 supplementary bunkers to be built by 1 October 1938: the *Limesprogramm*.
June Göring visits the West Wall and issues a damning report. Hitler charges Dr Fritz Todt with the completion of construction work in the west.
16 July Hitler decides on the suspension of all large-scale party and state building in favour of the *Limesprogramm*.
26–29 August Hitler visits the West Wall.
29 September The Munich agreement is signed.
5 October Germany occupies Czech Sudetenland.
9–14 October Hitler visits the West Wall for a second time. In a speech at Saarbrücken he announces the *Aachen-Saar Programm*.
Autumn The West Wall is extended along the Dutch border.
1939 **14 March** Germany occupies Bohemia and Moravia.
May Hitler visits the West Wall for a third time.
24 July Hitler visits the West Wall for a fourth and final time.
1 September Germany invades Poland.
3 September France and Great Britain declare war on Germany.
7 September France launches the 'Saar Offensive'.
1940 **10 May** Germany launches its offensive in the west.
26 May The evacuation of British forces at Dunkirk commences.
22 June France signs an armistice with Germany.
1941 **22 June** Germany invades the USSR.
December Work on the 'Atlantic Wall' begins.
11 December Germany declares war on the USA.
1942 **February** Dr Fritz Todt is killed in an air crash.
1944 **6 June** Operation Overlord: Allied forces land in Normandy.
22 August Hitler issues a decree for a levy of 'people's' labour for the West Wall.
24 August Hitler orders the building of a new West Wall.
25 August German forces in Paris surrender.
11 September First US Army reaches the German border.
Von Rundstedt is put in charge of western defences.
17 September Operation Market Garden is launched to establish a bridgehead at Arnhem.
21 October Aachen becomes the first German city to be captured by Allied forces when it falls to US troops.
16 December Germany launches the Ardennes offensive.
1945 **7 March** First US Army crosses the Rhine at Remagen.
7 May Germany's unconditional surrender is signed by Alfred Jodl.
8 May VE-Day

Design and development

In the immediate aftermath of World War I, Germany was a shadow of its former self. Exhausted by four years of war, she was subsequently compelled to accept the draconian peace terms agreed by the victorious powers at the Palace of Versailles in 1919. Germany's colonies were stripped away, as indeed was much of her territory; her armed forces were reduced drastically or scrapped completely. More specifically, Germany was forbidden from building or maintaining fortifications on the west bank of the Rhine or on the east bank to a distance of 50km. Allied Control Commissions enforced these restrictions, backed up by an army of occupation

For the time being the peoples of Europe could rest easy in the knowledge that Germany no longer posed a threat. However, it was recognised that an emasculated Germany in the heart of the Continent could not last forever. The depravations suffered by the German people meant that they were more vulnerable to political extremism, and the spectre of a left-wing revolution similar to that in Russia in 1917 and the creation of a Bolshevik state so close to home did not appeal. Equally significant was the fact that a poverty-stricken Germany meant that there was a reduced market for exports. The economic regeneration of Germany, of course, rekindled worries about possible German aggression. Could a powerful Germany be trusted to remain within its borders? No one knew, but most thought it prudent to prepare for the worst. As such, nations bordering Germany attempted to build a series of alliances to try to contain their neighbour. Treaties of mutual support, however, were of little use without the military might to back them up, so these nations increased their military spending and, almost without exception, started to build a series of concrete fortifications along their respective borders with Germany.

The Netherlands, Belgium, Czechoslovakia, and even Poland, which saw its main threat as coming from Russia, built defences. The most extensive and expensive defences were those built by the French. The Maginot Line, as it was christened, stretched along France's north-eastern frontier and consisted of a series of forts, reinforced-concrete blockhouses, anti-tank obstacles and barbed wire entanglements that would blunt any German attack and give France time to mobilise. These defences, and the less elaborate constructions of Germany's other neighbours, were seized upon by Hitler as evidence of their warlike intentions. If these countries would not disarm then Germany would take steps to protect herself – in contravention of the Treaty of Versailles settlement if necessary. They did not disarm and in 1935 Hitler announced the reintroduction of conscription, and that Germany had established an air force.

Already in 1934 Germany had taken steps to defend her western frontier with plans to construct the so-called Neckar-Enz and Wetterau-Main-Tauber lines. Because these defences were outside the demilitarised zone, there were no constraints on their construction. However, following Hitler's decision to reoccupy the Rhineland these plans were abandoned and work on the West Wall proper began. Soon engineers were reconnoitring the area to establish the best locations for defences. But the fortifications Hitler planned were not designed to prevent a pre-emptive strike by France. After all, France had made her position quite clear with the building of the Maginot Line. The French military had adopted a defensive mentality; casualties on the scale suffered in World War I would not, indeed could not, be suffered again. France would only fight if attacked. Hitler's aim in building the West Wall was altogether much more sinister and revolved around his desire for *lebensraum*, or living space, in the east.

A motorcycle patrol passes through what appears to be a recently completed section of the West Wall. When this photograph was taken in late September 1939 Poland had all but capitulated enabling regular German army units to be transferred to the west to man the lightly held defences. (Imperial War Museum)



Hitler had from the outset expressed the opinion that for Germany to be a great power, her people needed living space. To the east the Slav peoples farmed vast tracts of land. Hitler planned to seize this land, relocate the population and give the farms to German settlers. His ambitions, however, were tempered by the spectre of war on two fronts. Attempts to avoid this in World War I with the swift defeat of France had failed and thereafter Germany was left facing a desperate struggle as she attempted to fight in the east and the west. A quarter of a century later the possibility of fighting on two fronts was again a real possibility because of the treaties and agreements between France, Poland and Czechoslovakia. By building defences in the west it might be possible to deter France from invading Germany in support of her allies or, if France did attack, enable much weaker forces to slow the advance while the campaign in the east was brought to a swift conclusion. As a German Foreign Office paper noted, 'Apart from many other considerations, there is in the first place the defensive capacity of our western fortifications, which will permit the western frontier of the German Reich to be held with weak forces for a long time against greatly superior strength.'[2]

The job of building the defences and fulfilling this aim initially fell to the German army. Using *regelbau*, or standard designs, many of which had been developed for the so-called 'East Wall' that protected Germany's border with Poland,[3] the army contracted construction firms to build the defences, overseen by army engineers. Despite the use of standardised models, which enabled the authorities to produce standard components and to better plan raw material requirements, progress on the *Pioneerprogramm*, as it was known, was slow. The army first had to put in place the infrastructure to enable the building programme to commence, not the least of which was accommodation for the

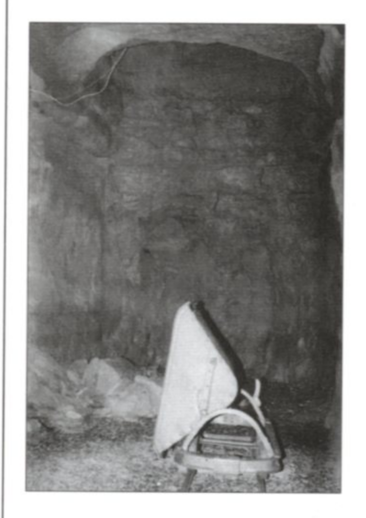
2 Noakes, J and Pridham, G (eds.), *Nazism 1919–1945 3: Foreign Policy, War and Racial Extermination* (University of Exeter Press, Exeter, 1991) p.691.

3 Restrictions on the construction of fortifications in the east were less stringent than those agreed by the peacemakers for the Rhineland.

RIGHT **A Typical Bunker under Construction**
In the foreground workers put together the steel reinforcing rods that provide additional strength for the concrete dragon's teeth. Men pour the concrete from the mixers while others remove the shuttering after the concrete has hardened. To the rear more labourers work to construct one of the bunkers that will mount a machine gun to cover the entire stretch of teeth. Overseeing workers is a Haupttruppführer of the Organisation Todt, in the background men of the *Reichsarbeitsdienst* (RAD) return to their quarters.



The construction of the West Wall employed the majority of the country's concrete mixers. Cement, sand and gravel were loaded into hoppers at the bottom and lifted up to the mixers which could then pour the mixture in the desired place. October 1938. (Bundesarchiv)



The tunnel system of the Gerstfeldhöhe was designed to have two levels – an upper or fighting level and lower or storage/sleeping level. To link the two a 68 metre high lift shaft was to be constructed. The hole was bored, but the lift was never completed. (Author's collection)

thousands of workers; and then there were difficulties with supplies of raw materials. By the spring of 1938 only 640 bunkers and pillboxes had been completed and it was anticipated that the work would not be completed until 1948! Hitler, never one to conceal his feelings, was incensed (despite the fact that part of the reason for the delay was his failure to accord the work a high priority). In May 1938 he issued new building targets: 1,800 pillboxes and 10,000 bunkers were to be completed by 1 October 1938 – the date that he now planned to invade Czechoslovakia.

As well as vastly increasing the number of structures and shortening the timescales, the *Limesprogramm*, as it was christened, also included the construction of *Luftverteidigungszone* (*West*), an air defence zone. This was situated to the east of the main defences and was designed to mount anti-aircraft guns, which would prevent enemy aircraft from reaching the German heartland. The threat of aerial bombardment had worried governments around the world – all the more so after the German bombing of Guernica in Spain in April 1937 – and Göring, under whose auspices the programme fell, was determined that the same fate would not befall the people of the Fatherland.

By the time of the Munich crisis in September 1938 the majority of the defences had been completed. Determined to avoid war and horrified by the thought of an attack on such seemingly strong defences, France and Great Britain acceded to Hitler's demands. Emboldened by his success, Hitler, in October 1938, ordered the construction of more defences under the pretext that the western democracies, not Germany, threatened the peace of Europe.[4] This phase was to see the strengthening of the defences around Aachen and the Saar, which in turn gave their name to the new schedule of defences: the *Aachen-Saar Programm*.

The final phase of the building programme began in late 1939 and continued into the spring of the following year. This saw the defences extended to the north to a point where the Rhine flowed into the Netherlands and provided a natural full stop to the defensive line. The defeat of France and the Low Countries saw work on the West Wall suspended until the autumn of 1944, by which time the Allies stood on the German border.

To complete a building programme on such a scale required an enormous amount of raw materials: gravel, sand, cement, iron and timber. It called for thousands of men and machines to dig the foundations, mix the concrete and bore the holes. Last, but not least, it absorbed vast sums of money to pay for the materials and the weekly wages of the engineers, construction workers and clerks.

The materials needed to construct the defences fell into three main areas: concrete, iron and timber. To provide an idea of how much concrete was required, the table opposite details just some of the different pillboxes and bunkers that were to be built as part of the *Limesprogramm* together with the volume of concrete needed to complete each one. This element alone, it was estimated, would require almost 3,500,000m³ of concrete.

To mix such enormous volumes of concrete required equally large quantities of raw materials. In the period up to 28 November 1938 almost 7 million tonnes of gravel and sand was supplied, together with almost 500,000 tonnes of stone chips and well over 1 million tonnes of cement. Unsurprisingly, the quarries in the border regions could not meet the demand and much of the stone had to be sourced from Bavaria, Thuringia and even as far away as Stettin.

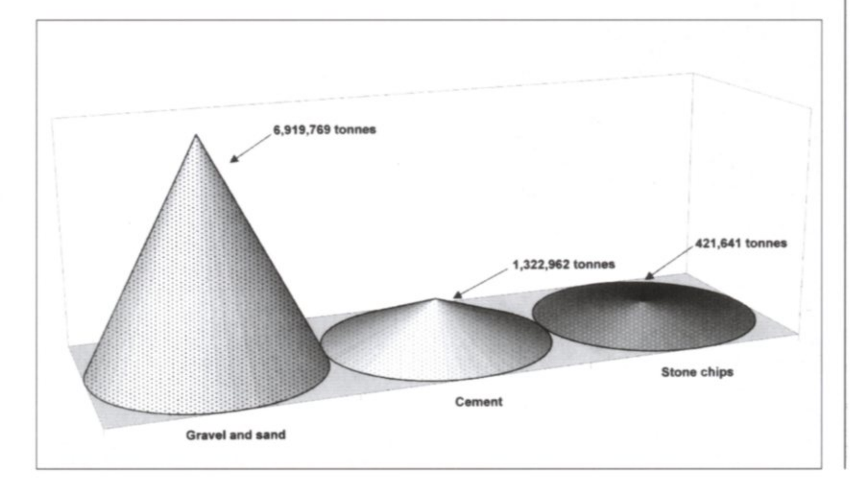
4 Hitler stated in a speech that the nature of the western democracies meant that warmongers (like Churchill) could be swept to power at any time and therefore Germany had to be prepared to defend herself.

Type	Description	Quantity	Concrete m³	Total concrete m³
1	Machine Gun (MG) Pillbox with armoured loophole	210	90	18,900
2	MG Pillbox with infantry section	62	168	10,416
3	Double MG Pillbox	74	160	11,840
10	Infantry section dugout	6265	280	1,754,200
11	Double infantry section dugout	2330	370	862,100
18	Gun emplacement for field gun (FK16 n.A)	120	385	46,200
19	Stand for artillery observer (open)	337	285	96,045
19a	Stand for artillery observer with armoured turret 21P7	27	285	7,695
19b	Stand for artillery observer with armoured turret 44P8	21	285	5,985
20	Gun emplacement for 3.7cm anti-tank gun (PaK)	96	360	34,560
20a	Gun emplacement for 3.7cm PaK	649	296	192,104
22	Gun emplacement for 8.8cm anti-aircraft gun (FlaK)	60	460	27,600
23	MG Pillbox	588	90	52,920
24	Double MG Pillbox without armoured loophole (Upper Rhine)	320	460	147,200
25	Double MG Pillbox with armoured loophole (Upper Rhine)	100	360	36,000
26	Double MG Pillbox without armoured loophole	176	140	24,640
27	Signals position	260	385	100,100
28	Stand for artillery observer with small cupola (Upper Rhine)	85	310	26,350
29	Six-loophole turret with infantry section (Small B-werk)	23	450	10,350
Total				3,465,205

Concrete requirements of regular structures of the *Limesprogramm*

The final production of the concrete required water and concrete-mixers. In some of the more remote locations, water had to be transported to the building site and almost all German cities sent water tankers. Considerable numbers of concrete-mixers were also required. Indeed, the West Wall absorbed 40% of all concrete-mixers over 250-litre capacity in Germany. Other heavy equipment needed to complete the building work included air compressors, needed to power drills for use on rocky terrain and to bore tunnels. More than half (60%) of all the air compressors available in Germany at that time were used on the West Wall. But even this was often not enough to meet demand. Requests were made to local builders, but few were forthcoming and manufacturers could not meet the demand.

To strengthen the concrete, iron reinforcing rods were used. This requirement, to-gether with the steel required for armoured turrets and plates, doors and hatches, placed a tremendous strain on the iron and steel industry. On 13 July 1938 Army Group HQ 2 published details of the approximate amounts of iron and steel that would be required to build the 11,860 bunkers and shelters detailed in the army fortification programme. For the bunkers alone 472,000 tonnes would be required, made up in the



The gravel and sand, cement and stone chips used in the construction of the west wall in the period to 28 November 1938 (both Army and Luftwaffe).



main of reinforcing rods (208,000 tonnes) and girders (135,000 tonnes). Over and above that, a further 170,000 tonnes would be needed for wire obstacles, reinforcing rods for the concrete anti-tank obstacles ('dragon's teeth') and telecommunication materials, bringing the grand total to 642,000 tonnes. Of this only 50,000 tonnes was currently available, meaning that almost 600,000 tonnes had to be produced before October 1938 if Hitler's target was to be realised.

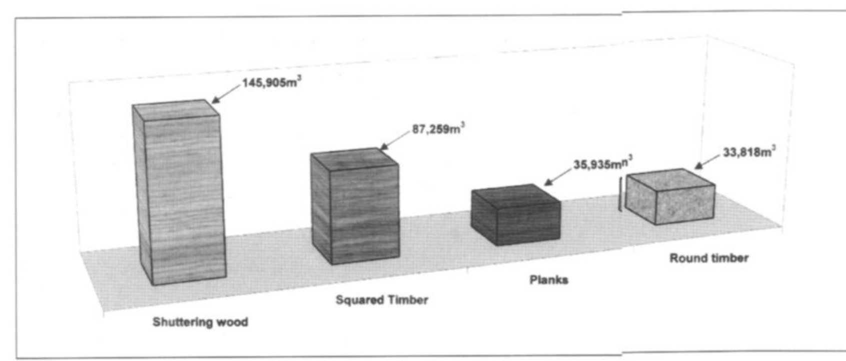
The round iron bar, section iron and sheet pile iron used in the construction of the West Wall in the period to 28 November 1938 (Army and Luftwaffe).

Hitler's decision in the autumn of 1938 to strengthen the defences around Aachen and Saarbrücken required the construction of another 1,064 structures together with a further 46km of 'dragon's teeth'. It was estimated that this programme of work alone would additionally require almost 100,000 tonnes of iron which, because of the urgency of the programme, would have to be delivered in the first quarter of 1939.

Easily overlooked in such a modern construction was the requirement for timber which was needed for, among other things, shuttering and scaffolding. In the period up to 28 November 1938 over 300,000m^3 of timber was supplied. In addition, over two million stakes were provided for use as obstacles and for stringing barbed wire. Indeed, such was the demand for timber that some of it had to be sourced from Austria. Requirements for the following year were significantly reduced, but still totalled more than 150,000m^3 with a further 120,000 timber poles needed which were to be rammed into the ground and used as anti-tank obstacles.

The transportation of the aggregates, iron, steel and timber also stretched the German transport system. The majority of the long-distance transport of building materials was carried out by the Reich Railway service and by river. Gravel, for example, mostly arrived by boat from the dredging of the Rhine between Rees and Duisburg. From its unloading point the gravel was transported by rail to destinations determined by the Organisation Todt (OT), a paramilitary organisation responsible for all major building programmes. At

LEFT **A Typical Bunker of the Limesprogramm**
The most widely constructed model (3,471 were built) of the *Limesprogramm* was the *Regelbau* 10 (standard construction 10). The shelter could be accessed via two gas-proof entrance areas which were bisected by a crenellated embrasure that covered both doors. Both entrances led to the stand-to area which acted as living and sleeping quarters for both the crew and the resident rifle squad (When the shelter was under attack the rifle squad would take up positions outside). There were fifteen beds in five tiers of three. The shelter also included a separate combat room which could only be accessed by the crew if they left the confines of the main bunker. Once there communication with their compatriots was via a speaking tube. Access to the combat room was secured with a wooden access door which was not gas-tight. A diagonal wall behind the door had a small aperture to cover the entrance. In the combat room itself was an open-mouthed embrasure with cement pedestal for mounting the machine-gun as well as a smaller crenellated embrasure with shutter (although most of these shutters were fitted after construction was complete).
The crew of a Regelbau 10 relax during the 'Phoney War' of September 1939. An officer and another soldier both in full uniform, sit at a table enjoying the autumn sunshine and a bottle of schnapps. A private tends the plants and flowers growing in the spoil heaped against the left edge if the bunker. The entrances to the shelter, bisected by the machine-gun aperture are clearly visible as is the separate entrance to the fighting compartment on the right.





TOP The shuttering wood, squared timber, planks and round timber used in the construction of the West Wall in the period to 28 November 1938 (both Army and Luftwaffe).

ABOVE The defences of the West Wall used enormous quantities of iron reinforcing rods. Here workers collect rods which will be knitted into a framework over which the concrete was poured. October 1938 (Bundesarchiv)

the height of the construction programme in the summer of 1938, the railway had a daily run of 4,500 wagons, which placed the whole rail network under enormous stress. Trucks took the gravel from the local distribution points to its ultimate destination. By the autumn of 1938 around 7,500 trucks daily carried out work for the OT.

The postal service, which had developed an extensive transport network for the delivery of mail, was made responsible for the movement of workmen. To achieve this task, the *Kraftpostgruppenleitung* West, or Vehicle Group Management Unit West, was established. The operation was based in Frankfurt/Mainz with regional offices in Aachen, Trier and Speyer and it requisitioned buses from all over Germany, to the extent that services in other parts of the country had to be cancelled or severely curtailed. Even then buses had to be hired from private companies to meet the transportation needs which by the autumn of 1938 had spiralled to 3,500 in number.

Predictably, the cost to Germany of the West Wall was far greater than a few cancelled buses. The construction of the defences led to the suspension of all large-scale party and state building programmes, but, more significantly, it was also hugely expensive. On 9 July 1938 the Inspectorate of Western Fortifications submitted an initial cost forecast for the 11,888 bunkers and pillboxes that were to be constructed as part of the *Limesprogramm*. It estimated that, excluding the armoured components, the total cost would be in the region of Reichsmarks (RM) 520 million (see opposite). On top of that it calculated that a further RM 32 million would be needed for the expansion of the telecommunication network, RM 64 million for the construction of obstacles (e.g. 'dragon's teeth') and RM 19.5 million for the construction of the 190 camps it was anticipated would be needed to house the workers.

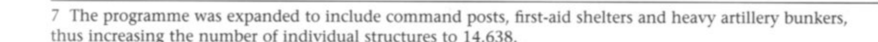
The calculation of the overall cost was based on a price per unit, but as with so many procurement programmes the forecast was too optimistic. A simple example goes some way to explaining why this was the case. According to forecasts a Type 11 bunker was supposed to cost RM 55,793.[5] In fact this did not even cover the wages of the workers. The preparation and pouring of each cubic metre of concrete was estimated to absorb seven to eight days of work. Since the structure required 380m³ of concrete, it followed that some 2,660–3,040 man days of work would be required. With each man working only 180 days a year, then, simplistically, it would take 15–17 men to construct one shelter in a year. With each man receiving as a bare minimum RM 4,200 a year, a shelter like this would cost anything from RM 63,000 to RM 71,400 in wages alone. If the costs of materials,[6] transport and administration

5 This compares with the average cost of a family house at this time of RM 10–11,000.
6 The price of a cubic metre of concrete alone in 1938 was estimated at RM 300 (and this did not include any reinforcing rods or armoured plate), meaning an additional RM 114,000 had to be added to the price of a Type 11 shelter.

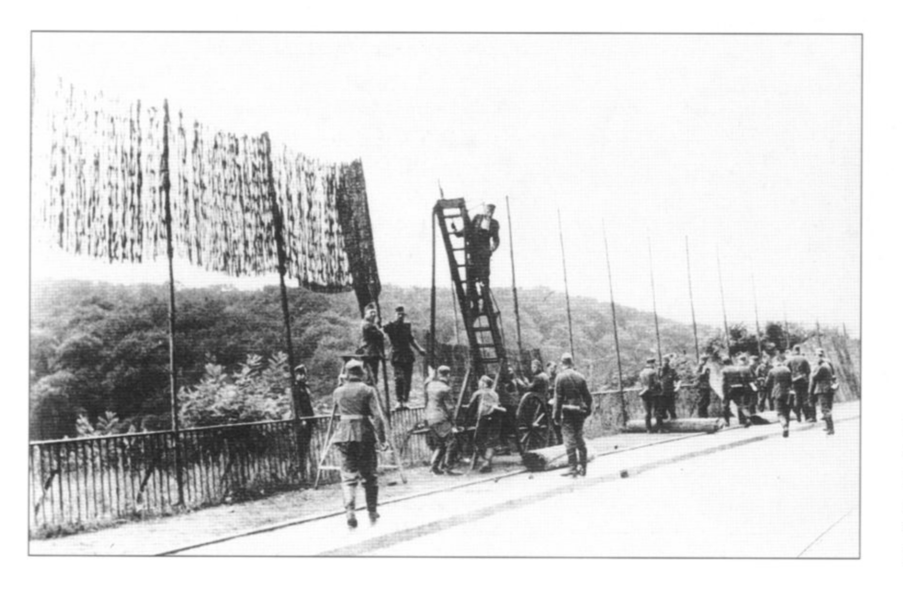
Type	Description	Quantity	Individual Price RM	Total cost RM
1	Machine Gun (MG) Pillbox with armoured loophole	210	13,333	2,800,000
2	MG Pillbox with infantry section	62	25,806	1,600,000
3	Double MG Pillbox	74	24,324	1,800,000
10	Infantry section dugout	6265	42,000	263,000,000
11	Double infantry section dugout	2330	55,793	130,000,000
18	Gun emplacement for field gun (FK16 n.A)	120	57,500	6,900,000
19	Stand for artillery observer (open)	337	38,278	12,900,000
19a	Stand for artillery observer with armoured turret 21P7	27	44,444	1,200,000
19b	Stand for artillery observer with armoured turret 44P8	21	42,857	900,000
20	Gun emplacement for 3.7cm anti-tank gun (PaK)	96	54,166	5,200,000
20a	Gun emplacement for 3.7cm PaK	649	43,702	28,800,000
22	Gun emplacement for 8.8cm anti-aircraft gun (FlaK)	60	68,333	4,100,000
23	MG Pillbox	588	13,353	7,900,000
24	Double MG Pillbox without armoured loophole (Upper Rhine)	320	69,062	22,100,000
25	Double MG Pillbox with armoured loophole (Upper Rhine)	100	54,000	5,400,000
26	Double MG Pillbox without armoured loophole	176	21,022	3,700,000
27	Signals position	260	57,692	15,000,000
28	Stand for artillery observer with small cupola (Upper Rhine)	85	47,058	4,000,000
29	Six-loophole turret with infantry section (Small B-werk)	23	63,565	1,600,000

Production costs of regular structures of the *Limesprogramm*

were added to this figure, together with the costs of the additional shelters added later in 1938,[7] it is not surprising that the real cost of the *Limesprogramm* was estimated to be in excess of RM 1 billion. Even the economic wizard Dr Hjalmar Schacht, Minister of Economics and President of the Reichsbank, could not easily disguise such expenditure, so it was justified on the grounds that it actually represented a saving to the military budget. It



7 The programme was expanded to include command posts, first-aid shelters and heavy artillery bunkers, thus increasing the number of individual structures to 14,638.



Every effort was made by the Germans to prevent the Allies gathering intelligence on the western defences. Here soldiers construct a screen to obscure the enemy's view. September 1939. (Bundesarchiv)

A: MG combat room (2.2x3.1m)
B: Observation Room (1.2x2.3m)
C: MG combat room (2.2x3.1m)
D: Munitions room (1.1x2.1m)
E: Stand to/sleeping area with twelve beds (2.1x7.7m)
F: Store room (1.1x2.7m)
G: Flanking installation (1.43x1.8m)

LEFT **A Typical Bunker of the Aachen-Saar Programm**

By the time of the Munich crisis of September 1938 the majority of the defences had been finished. But despite the exertions of the Organisation Todt to complete the defences in time for the invasion, and only two weeks after the Munich Agreement, Hitler announced the beginning of the *Aachen-Saar programm* – Phase 4 of the West Wall.

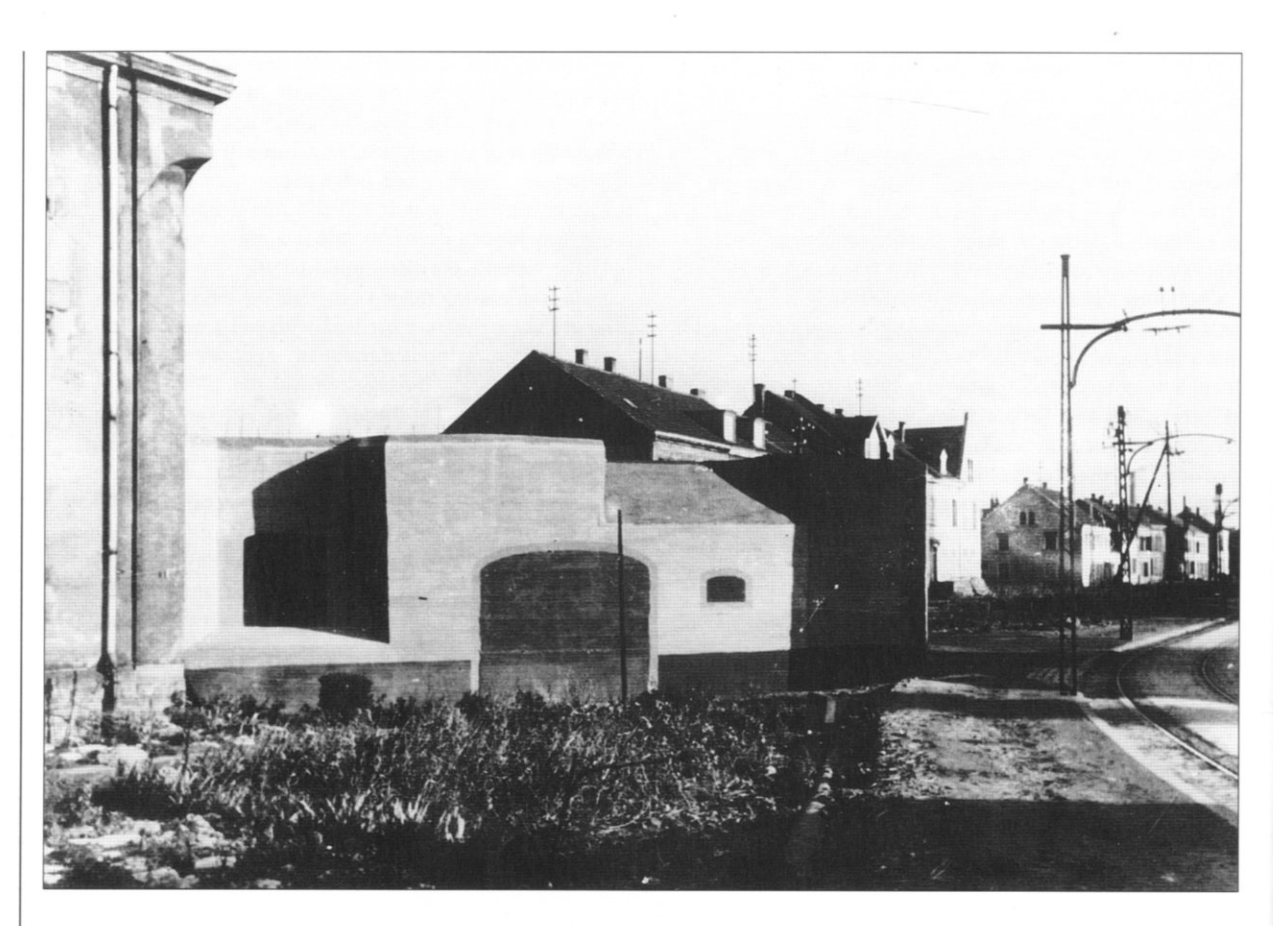
Although the enormous effort invested in the West Wall as a result of the *Limesprogramm* undoubtedly increased the strength of Hitler's border defences they still suffered from a number of shortcomings. One of the main criticisms was that for a system of defences designed to delay an enemy attack relatively little space had been provided for the storage of ammunition or provisions which might allow the defenders to fight an extended campaign. A further criticism was that the main fighting compartment often doubled up as the garrison's accommodation, or was separate to the main bunker.

The Aachen-Saar Programm sought to rectify these problems and more. The bunkers were strengthened with thicker walls and ceilings. The new designs were also far roomier and new storage areas for food and ammunition were introduced, as was a special room for an observer equipped with either a periscope or an observation cupola. The interior of the stand-to area was also improved with the addition of plywood cladding. This not only made the shelter more homely, but, more importantly, significantly reduced the choking dust and splinters produced when the bunker suffered a direct hit. Importantly, separate fighting compartments were also dispensed with.

The bewildering range of models developed for the *Limesprogramm* were dispensed with and a new series of standard constructions developed which were numbered 101–139 (After the outbreak of war the 100 series was supplemented by shelters of the 500 series). Four variations were developed – with or without a flanking structure or small cloche and all combinations thereof. Moreover, with the exception of those features that were specific to the design e.g. command posts or medical aid stations, a system of 'building blocks' was developed. This meant that each shelter had, for example, an identical entrance area. If conditions dictated, it was also possible to construct a mirror image of the standard construction. In the period to July 1940 some 3,828 bunkers were constructed as part of this programme.



A German staff car passes a warning sign that stands in front of a line of dragon's teeth. The sign explains that this is a restricted area and explicitly forbids photographs and the entry of unauthorised personnel. (Bundesarchiv)



Bunkers and pillboxes were often built in towns or villages. This example covers the main road and a tram line and has been camouflaged to fit in with the surroundings. November 1939. (Bundesarchiv)

was argued that during the Czech crisis the defences had removed the need to deploy massive forces in the west and had prevented a pre-emptive strike by France. No price could be placed on such a benefit.

Although the statistics were impressive, much of the strength of the West Wall lay in the image that was portrayed of an impregnable barrier; an image that was accepted blindly by the military, politicians and the general public of the western democracies, keen as they were to avoid war. Thus the films, books and press reports that spilled forth from Dr Josef Goebbels' propaganda ministry were accepted at face value with few, if any, questions asked, in spite of numerous rumours emanating from Germany. A report by British Military Intelligence noted that, 'There have been many reports in the press recently of the unsatisfactory work that has been put into these fortifications, e.g. flooding casemates, crumbling of cement and the like. While it would be unwise to dismiss these reports as being wholly without foundation, it is considered that the German western defences are on the whole formidable and that each month sees an increase of strength and a greater degree of preparedness. Similarly it is not believed that these defensive lines are tactically badly sited. The Germans had considerable experience of field fortifications in the Great War, e.g. the Hindenburg Line and are fully aware of their importance in military operations.'

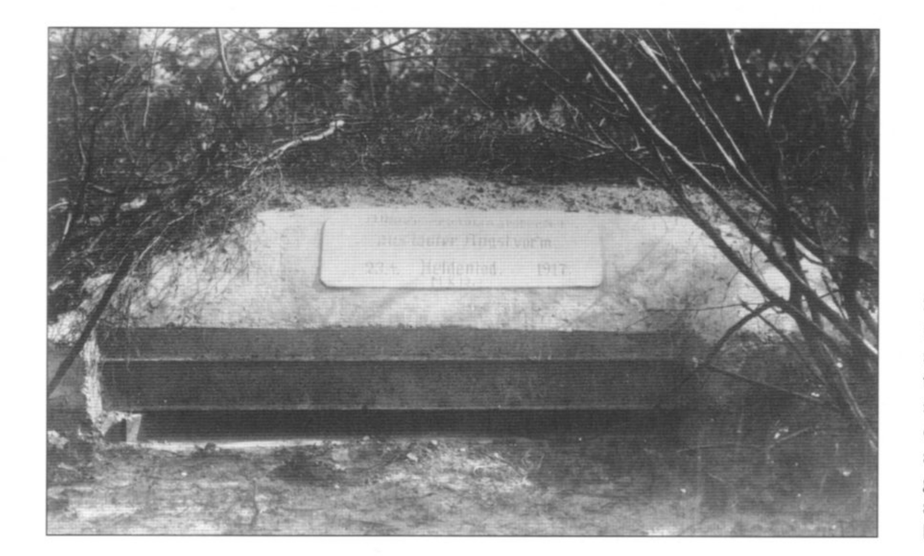
Of course, with the benefit of hindsight it is easy to judge. At the time, however, it was difficult to substantiate any stories coming out of the border region. The area around the defences was prohibited to all except workers, the military and local residents, and over-flying the restricted area was also dangerous. Moreover the Germans went to extraordinary lengths to disguise the scale of the building programme with camouflage netting and screens; and some shelters were cleverly disguised as houses, shops or other innocuous-looking buildings.

The principles of defence

The debate over what form the German border defences should take was as heated as it had been in France a decade before. Should a continuous line be constructed or a series of strong points? Should they be in a narrow band or built in depth? In the end the French military decided to build a thin, but immensely strong, line of defences. These would act in much the same way that the forts at Verdun had; the German forces would exhaust themselves trying to smash through the concretised defences and then the French army would be able to sweep forward to victory as they had in 1918. That was the theory at least. In Germany, a very different conclusion had been drawn from the fighting on the Western Front.

The initial, sweeping advance of the German Imperial Army in the summer of 1914 was eventually halted by the Allies and the fighting settled down into a bloody stalemate. Both sides dug trenches stretching from the English Channel to the Swiss border and gradually the trench systems were strengthened to include deep shelters and concrete pillboxes to protect the infantry from the devastating effects of artillery fire. Thick bands of barbed wire were erected and positioned to funnel attacking troops into pre-prepared 'killing zones'. Yet, in spite of these elaborate measures, there was still concern in some quarters of the German High Command that these defences were not strong enough to stop a full-scale Allied attack.

Colonel Fritz von Lossberg, Chief of Staff of the German First Army, formulated a solution to the problem. He suggested a deepening of the existing defences with the introduction of a series of defensive zones. Immediately facing the enemy was the outpost zone. This was only lightly defended and was designed to slow the enemy attack. Once past this position the enemy would enter the battle zone, which was peppered with mutually supporting forts and strong points. Behind these positions were more trenches. Later von Lossberg ordered a further line of defences, so that when complete the Hindenburg Line was in places eight kilometres deep. The theory behind the system of defence in depth was simple. As the enemy advanced through the zones it became weaker and weaker and was less able to maintain the momentum of the attack.



Some of the defences of the Hindenburg Line were very substantial and not that far removed from some of the more basic structures of the West Wall. This concrete and steel pillbox was built at Le Pave. The inscription reads, 'In greatest need was this built here, for a hero's death I greatly fear, 23.4.17 M.K.19'. (Imperial War Museum)

To reinforce the dragon's teeth the concrete was poured over iron rods. Workers are seen here preparing the framework closely observed by an army engineer. The channels which are visible provided foundations for the teeth and linked them all together for added strength. (Bundesarchiv)



More critically, as the attackers were drawn deeper into the maze of defences they moved beyond the range of their supporting artillery, leaving them dangerously exposed. Exhausted and isolated the enemy was vulnerable to counter-attack by troops held in the rear, safe from enemy fire.

Although the Hindenburg Line ultimately failed to block the Allied advance, the principle of flexible defence in depth had been established. Thus, when the decision was taken to fortify the German border, von Lossberg's idea was adopted. Clearly, the situation facing the military planners in 1936 was very different to that faced by their predecessors 20 years earlier. Then the front line had been established and could not be changed without attacking or surrendering hard-won territorial gains. Now a defensive line could be built to take advantage of geographical features that would give the defender the upper hand in any future war. Hitler disagreed. He was determined that no part of German territory would be violated and insisted that as far as humanly possible the defences would follow Germany's national border. Equally contentious was the form that the defences should take. Two schools of thought emerged: one that favoured a linear defence system that stretched the entire length of the border; and another that propounded concentrating on more vulnerable sections of the border where the enemy was most likely to strike. At first, the idea of the linear defensive system, as favoured by Field Marshal Werner von Blomberg, Supreme Commander of the Wehrmacht, was adopted. Following von Blomberg's resignation in February 1938, Hitler became the Supreme Commander. Typically, Hitler wavered between the two solutions. Initially he endorsed the linear defensive strategy, ordering an extension of the line along the border with Belgium and Holland. Later, however, he ordered the construction of thick bands of defences to protect Aachen and the Saar, both natural avenues of attack.

RIGHT **A Bird's Eye View of the Defensive System**
By contrast with the Maginot Line, the defences of the Siegfried Line were built on the concept of defence in depth. The idea had been developed in the First World War and was now adopted for Hitler's impregnable West Wall. The attacker would be drawn further and further into the thick band of pillboxes. Their progress would be slowed or stopped completely allowing Germany time to mobilise her reserves and repel the invader. Bunkers that could mount both anti-tank weapons and machine guns and which could house a small detachment of soldiers were constructed all along Germany's western border. They were constructed in such a way that the fire from one shelter covered the approaches to another. At particularly weak points the defences were some miles deep. Where the terrain was suitable for the movement of tanks, anti-tank defences were constructed – usually the so-called dragon's teeth.

To form the rows of dragon's teeth concrete was poured into wooden moulds. The shuttering was then removed and the teeth often painted. Some of the workers here wear the armband of the Organisation Todt. (Bundesarchiv)



In spite of Hitler's personal interest, the defences of the West Wall were far from the impregnable barrier portrayed by Goebbels' propaganda ministry. Unlike the Maginot Line, which was begun in 1929 and was still under construction a decade later, the West Wall was built in indecent haste and suffered accordingly. Initially, the work was carried out by private building contractors, overseen by army engineers. Many of the companies took advantage of the authorities' failure to introduce simple checks. Superior-quality materials supplied by the state were often misappropriated and substituted by inferior alternatives; deliveries of raw materials were often 'light'; and stories even abounded of government-supplied equipment being sold off. To make matters worse, Hitler's other massive public works programmes, like the Autobahnen, meant that raw materials were in short supply. Indeed, in an extraordinary memorandum to General Ludwig Beck, Chief of the General Staff, in 1937 it was noted that, 'The Führer has determined the distribution of the steel consignment. The fortifications were not mentioned.'[8]

Hitler's failure to accord the work on the West Wall a high enough priority, and the need for the army to put in place the basic infrastructure (roads, sleeping accommodation, etc.) before any work on the defences could start, meant that little progress had been made on the fortifications by May 1938. This infuriated Hitler and he now ordered an escalation of the scale of the programme and stipulated an October deadline. Unconvinced of the army's ability to meet his demands, he placed Dr Fritz Todt in charge of the construction programme. Todt was a personal favourite of Hitler following his successful completion of the German motorway network and now he transferred his efforts and his labourers to work on the West Wall.

Many of the men of the OT and the *Reichsarbeitsdienst* (RAD) – the State Labour Service – were conscripts who had little experience of heavy manual work and had been forced to leave their homes to work on the border defences. They now found themselves working long hours, often in difficult and dangerous conditions, for little pay. They were housed in rudimentary, prefabricated accommodation and enjoyed only a basic diet. Not surprisingly the poor working conditions, homesickness and lack of skills meant that the defences were often poorly or even incorrectly finished. A contemporary source noted that, 'Partly as a result of the extreme haste with which the fortifications were being built, partly because of the "unintentional sabotage", the Siegfried Line soon began to show defects. The floods, especially of this year [1939], showed up the weaknesses. Whole stretches of the line on the banks of the Rhine had to be reconstructed. There were reports in August that newly

8 Westphal, S *The German Army in the West* (Cassell, London, 1951), p.43.



Hitler made four visits to the West Wall while it was under construction. He was interested in all facets of the programme down to the minutest detail. Here the Führer addresses workers employed in the building of the defences. (Imperial War Museum)

constructed forts were blown up to make room for new forts to be built on higher ground out of reach of the Rhine floods.'[9]

Although still responsible for tactical aspects of the construction programme, the army had now been effectively usurped by the Organisation Todt. This greatly angered the military high command and caused friction between the two bodies. Instead of working in harmony to create a cohesive defensive line, the two blamed each other for the difficulties and delays. To make matters worse, from May 1938 onwards Hitler took a close personal interest in the project. He designed his own bunkers and on his numerous visits offered advice to local commanders. Unsurprisingly, the military increasingly lost faith in the worth of the West Wall. General von Mellenthin, a corps commander inspecting the West Wall defences opposite the Maginot Line, was appalled by the state of the defences, noting that they 'were far from being the impregnable fortifications pictured by our propaganda.'[10] Many senior German officers agreed with him – Field Marshal Gerd von Rundstedt, commander of Army Group 'A' for the western campaign, is said to have laughed when he inspected the defences.

General Siegfried Westphal, who was later to become von Rundstedt's Chief of Staff, echoed this sentiment in his memoirs: '...what was constructed did not amount to an impenetrable wall of fortifications as our propaganda called it...The majority of the emplacements had concrete roofs of only eighty centimetres thickness which afforded no protection against heavy shells. Many of the positions only had loopholes at the front and were thus at a tactical disadvantage...Because of the short time available it had been impossible to fit the emplacements into the terrain as well as the tacticians desired. Many of them lay not on the more favourable rear slopes but on the front slopes of the hills. Anti-tank obstacles were only present in comparatively few places. One particularly worrying feature was that some of the emplacements possessed no loopholes at all and could therefore only be used as shelters.'[11] This last point

9 Eastwood, J *Topics of the Moment. The Maginot and Siegfried Lines* (Pallas Publishing, London, 1939), p.50.
10 Whiting, C *West Wall: The Battle for Hitler's Siegfried Line* (Spellmount, Staplehurst, 1999), p.14.
11 Westphal, S op.cit, p.73.



The defences to the north of Aachen (with the exception of those around Cleve) were less well developed than those to the south. Often they consisted of barbed wire entanglements, or, as here, revetted trenches. When the West Wall was originally built the border with Belgium and the Netherlands was not considered a priority. (Canadian National Archives)

was not surprising given the fact that in his memorandum of 1 July 1938, Hitler had stated that the emphasis should be on numbers not perfection.

Another major shortcoming was that the defences to the north and the far south were very weak. In a meeting prior to the Munich conference on 29 September 1938 'Hitler…made a clean breast of the fact [to Mussolini] that the western front was "completely exposed". There had been some fortification between the Rhine and the Moselle, but only weak forces were deployed there. On the Belgian and Dutch frontiers there was virtually nothing, and the situation on the upper Rhine was "not much better."'[12] In the early stages of the war this was of little consequence since both Belgium and the Netherlands were neutral and Hitler calculated (rightly) that Britain and France would not violate their respective borders. By September 1944 the situation had changed markedly. The vulnerable northern flank was now exposed to enemy attack and the Allies sought to exploit the situation in the daring, but ultimately unsuccessful, attempt to capture the bridges at Eindhoven, Nijmegen and Arnhem.

With the failure of Operation Market Garden the Allies were left with little choice but to fight their way through the main defences of the Siegfried Line. The prospect was not an enticing one. However, the years that had passed since Hitler boasted of the defences' invincibility had taken their toll. Little if anything had been done to maintain the structures, and many were now flooded or heavily overgrown. Still others had had all their fittings removed and either placed in storage or used in the Atlantic Wall.

More worryingly, the defences were alarmingly outmoded, the fighting of the previous five years having seen the development of more heavily armed tanks. Germany entered the war with the Panzer I armed with twin MG34 machine guns and now fielded the King Tiger with its impressive 88mm gun; and more powerful anti-tank weapons were available, many of them man-portable like the bazooka. The bunkers of the West Wall had not been designed to withstand the impact of such weapons. Equally significant was the fact that the majority of the bunkers could not accommodate these new weapons. Certainly, the larger and more potent German anti-tank guns could not be mounted in the older PaK shelters and so they had to be emplaced in the open. Improvised solutions to this problem were developed, but time, materials and labour were in short supply and it was unrealistic to think that they could fill this void.

In 1936, when the defences were first planned, the need to accommodate such powerful weapons was not even considered. The earliest and simplest shelters that were constructed were often provided with no more than simple loopholes. These could accommodate light machine guns, rifles and small arms and gave the defenders the added flexibility of taking their weapons outside and fighting in the open. Later models had steel or concrete apertures designed

12 Taylor, T Munich *The Price of Peace* (Hodder and Stoughton, London, 1979) p.22.



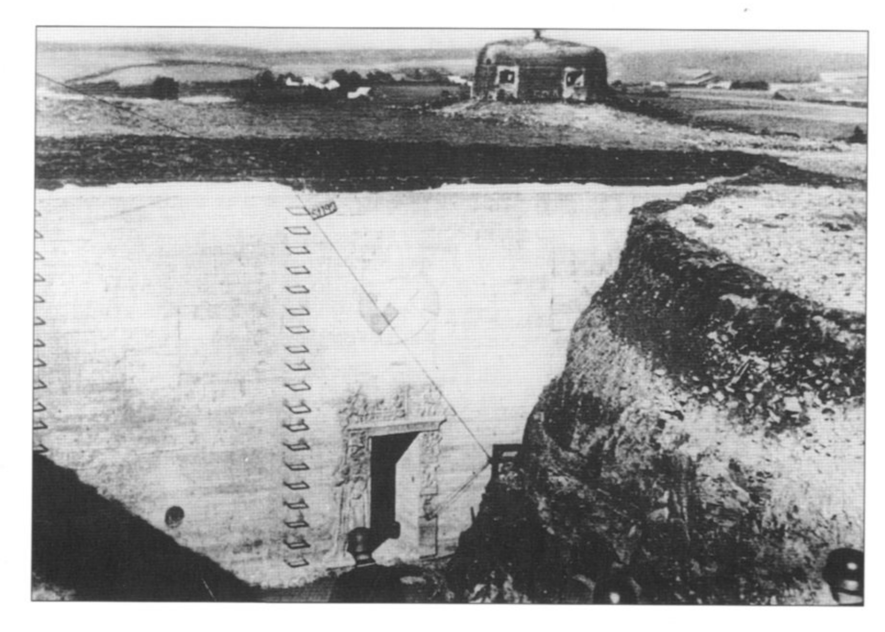
The early defences of the West Wall were very primitive. Here an anti-tank shelter near Pirmasens has been prefabricated out of wood which is being covered in spoil for added protection. Just visible in the gloom is the outline of the anti-tank gun. (Imperial War Museum)

to accommodate particular weapons. Which weapons were supplied for the respective shelters was based on the simple principle that each shelter could only mount the weapons for which it was designed. So, for example, pillboxes were fitted with either the older 7.92mm MG08 or MG34 machine guns. The former was a World War I-vintage water-cooled weapon, mounted on a carriage that enabled the weapon to be moved into and out of position more easily. When not in use a thick steel plate could be inserted over the aperture. Despite its age it was a very effective and reliable weapon; indeed some were still in service at the end of the war. More elaborate bunkers were fitted with thick armoured cupolas with either three or six loopholes. These were mounted with one or two MG34 machine guns that could be swivelled from loophole to loophole. The MG34 was the standard German machine gun of the period and was capable of firing 900 rounds per minute. However, because of shortages it was not always possible to supply all the weapons required. For example, following the outbreak of war each pillbox in the Lower Rhine region could only be supplied with a single machine gun and elsewhere the position was similar. The situation was such that the old MG08/15, a lighter version of the MG08 with a pistol-style grip, shoulder stock and bipod, had to be deployed.

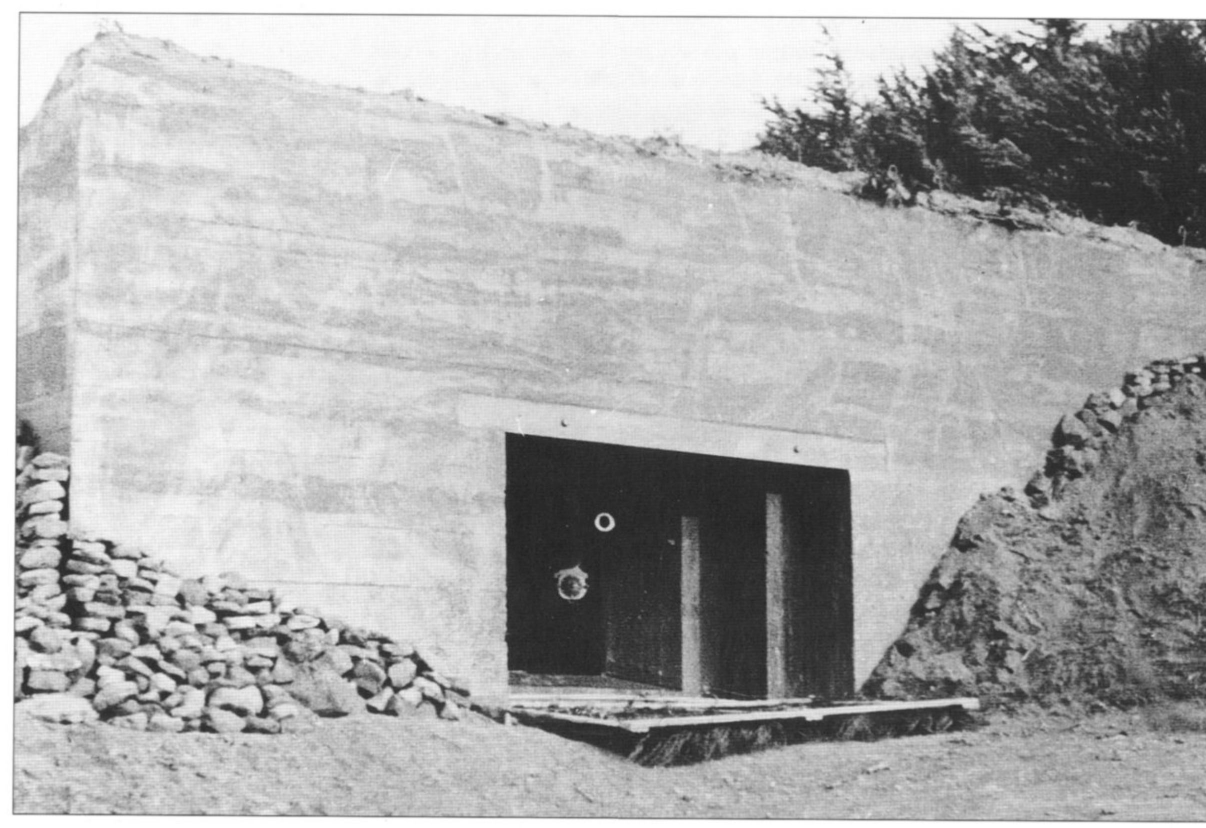
To enable the pillbox to be manned for any length of time it was necessary to keep a supply of spares in the shelter. For the MG08 this typically included:

5 barrels	4 cartridge drums with steel bands
3 locks	4 full water containers
steam hose	1 full oil container
supplementary box	1 full petroleum container
tool bag	1 full glycerine container
carriage superstructure	1 telescopic sight
shoulder support	1 directional support
spring clip	2 barrel containers
4 carrying belts	front sight
25 cartridge boxes	angle wipe stick

It was also necessary to have sufficient ammunition for a prolonged stay. The storage of ammunition within the various shelters was calculated according to the planned number of weapons. This ammunition was to be held in reserve and was only to be used if regular supplies did not arrive. This caused



The entrance to this bunker has been decorated with Nazi inspired imagery. Above the door is a stylised swastika. Needless to say few bunkers were so ornately decorated. The shelter is fitted with a six embrasure armoured turret. (Bundesarchiv)



As a well as pillboxes to mount machine guns, shelters were built to accommodate artillery pieces. This artillery fort is ready for action with the simple camouflaged screen lowered in front of the main aperture. (Bundesarchiv)

something of a problem with the bunkers and pillboxes of the older type, principally those built in the period between 1936 and 1938, that generally did not have special ammunition storage facilities. As a bare minimum these positions had to have 10,500 rounds of ammunition, of which 5,000 rounds were to be belted. The rest of the ammunition was to be placed in collective stores which had to be located nearby and which, as an absolute maximum, would enable supplies to reach any position in no more than six hours. Where

Type	Concrete Thickness (m)	Steel Thickness – Cupolas (cm)	Steel Thickness – Armour plate (cm)	Bunker Types	Phase
A	Exterior 3.5 Interior 1.0 Ceiling 3.5	60	25–52	30, 30a, 36, some types over 100,	4 and 5
A1	Exterior 2.5 Interior 1.0 Ceiling 2.2	42	25–35	A-Werke 35, A1-Werke (concept only?)	
B alt (until 23/12/38)	Exterior 1.5 Interior 0.8 Ceiling 1.5	25	20	1 to 36, B-Werke	2 – B-Werke and 3
B neu (from 23/12/38)	Exterior 2.0 Interior 0.8 Ceiling 2.0	25	20	96, 100-, 500- and 700 series	4 and 5
B1	Exterior 1.0 Interior 0.5 Ceiling 0.8	12-16	10	B1-1 to B1-29 (and separate arms rooms coupled to the types 10, 10a and 11	1 and 2 (also 3 by way of the separate arms rooms for 10, 10a and 11)
C	Exterior 0.6 Interior 0.3 Ceiling 0.5	6	6–7	C-1 to C-8	2
D	0.3	5	2–5	D-1 to D-5	2

Bunker Classification

Phases:

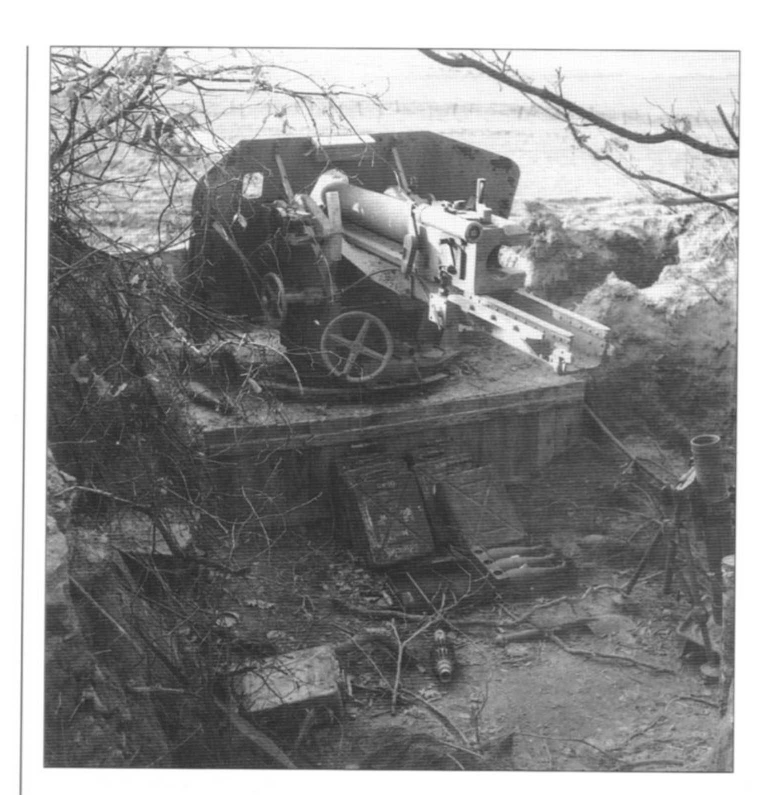
1 Wetterau-Main-Tauber Stellung and Neckar-Enz Stellung, 1934
2 Pioneerprogramm, 1936 to 1938
3 Limesprogramm, May 1938
4 Aachen-Saar Programm, October 1938
5 Autumn 1939 to Spring 1940

this was impossible the bunker had to have a special extension constructed to store the requisite amount of ammunition. The amount of ammunition to be stored for rifles and pistols was also stipulated, but it is unclear whether these quantities were actually part and parcel of the fortification supplies, or whether it was simply a guide for the benefit of the men occupying the shelter.

Other shelters were designed to accommodate anti-tank and anti-aircraft guns and artillery pieces. The anti-tank positions typically housed the 37mm PaK 35/36, one of the best anti-tank guns of the time and capable of piercing the armour of almost any tank then in service. Provision was also made for artillery in open and closed positions. Standard construction 18, for example, which was developed for the *Limesprogramm*, was designed to house the 7.5cm *Feldkanone* 16 *neuer Art*. A modernised version of the World War I gun, they were all later removed from the West Wall and used in the Atlantic Wall. Also



In the final months of the war the West Wall was strengthened with a number of improvised fortifications. One of the deadliest was the use of Panther turrets mounted on concrete, steel, or wooden shelters. This example was located near Niederwürzbach (Saarland) but is now on display at the Westwall Museum, Niedersimten. (Author's collection)



The defences to the north of Aachen were less well developed than those to the south, often little more than field works. This anti-tank gun, near Hochwald, was secured to an improvised mounting. The position was captured by the Canadians in March 1945. (Canadian National Archives)

as part of the *Limesprogramm*, shelters were constructed to house a number of large naval guns. Two 24cm and two 30.5cm guns were positioned so as to be able to bombard France (see map on page 6). To the rear, in the *Luftverteidigungszone* (*West*), shelters were designed to mount machine guns in their role as a fallback position, but also to accommodate the famous '88' anti-aircraft gun which could be used against ground targets as well as aircraft.

The larger forts, or B-Werke, of the West Wall were more heavily armed. Each of the 32 examples, although unique, shared some common features. They were fitted with six loophole-armoured cupolas; a 5cm mortar which could fire 120 rounds per minute to a range of 600m; and for close-in protection a flame-thrower that was capable of rotating through 360 degrees. Peculiarly, each B-Werk was supposed to hold a double inventory of weapons, although it is not clear whether this was in fact the case.

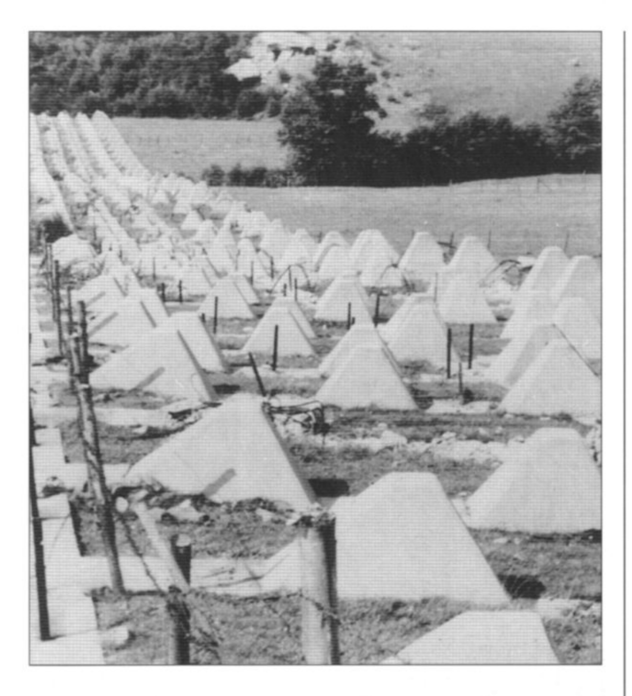
Following the defeat of Czechoslovakia the German army acquired a vast array of weapons, many of which were quickly pressed into service. The Czech 4.7cm anti-tank gun (originally built for the Czech-Sudeten defences) and the 8.35cm Flak were both used to bolster the West Wall, the guns having shelters specially designed for their use (Standard constructions 506 and 517 of the *Aachen-Saar Programm*).

In the summer of 1944 work to strengthen the West Wall began. Shelters were built to house both the standard and pivot-mounted 8.8cm PaK, which was more than a match for the relatively lightly armoured Allied tanks; and Panther tank turrets, with their deadly 75mm main gun, were mounted on concrete, steel or even, exceptionally, wooden bases. Still other anti-tank weapons were mounted on improvised frameworks and rushed to the front where they were located in open fieldworks.

Other, simple defences were also developed, like the 'Koch' shelter, named after the Gauleiter who supposedly developed the idea. It was simply a concrete tube dropped vertically into the ground and provided protection for a single infantryman. Also, numerous 'Tobruk' shelters were built which could mount machine guns, mortars and other light weapons, including obsolete tank turrets.

Tour of the sites

In front of the main fortifications a series of obstacles were constructed to block the enemy's advance. Thick bands of barbed wire entanglements, held in place by stakes and strewn with anti-personnel mines, awaited the enemy infantry, while larger anti-tank mines were laid where tanks could traverse. More elaborate anti-tank defences were also constructed including *Panzergraben* (anti-tank ditches), various steel prefabrications, wooden poles rammed into the ground and, most famously, what were officially known as *Höckerhindernis* ('dragon's teeth'). The latter were a series of concrete pyramids increasing in height from front to back and which resembled a set of sharp teeth, hence its nickname. Initially four rows of 'teeth' were constructed, but later five or even six rows were built to counter the threat posed by the much larger and more powerful tanks that were being built. The last row of 'teeth' rose to 1.5m in height – not much less than the average height of a man.



In front of the main defences, the Germans constructed miles of concrete anti-tank obstacles, or dragon's teeth. The enemy would advance from the left and would be confronted by rows of increasingly large concrete teeth. To hamper the infantry, iron stakes were strung with barbed wire and were positioned along the length of the line. (Public Record Office)

When the defences were built, Germany was still at peace and it was therefore necessary to keep open the roads and tracks that ran through the 'dragon's teeth'. Various alternatives were developed, including steel gates and the so-called *Trägersperre*, a concrete structure built astride the road with recesses which could be fitted with steel H beams to bar access.

Behind these obstacles, hundreds of individual bunkers and pillboxes were built, but although different they all shared certain common features. Doors of varying types controlled access to the shelter and to the various rooms within the structure. These doors fell into two general types: armoured doors and gas-tight sheet metal doors (although latterly some wooden doors were fitted out of necessity). In total, some 192,725 doors were manufactured in the period up to 1941.

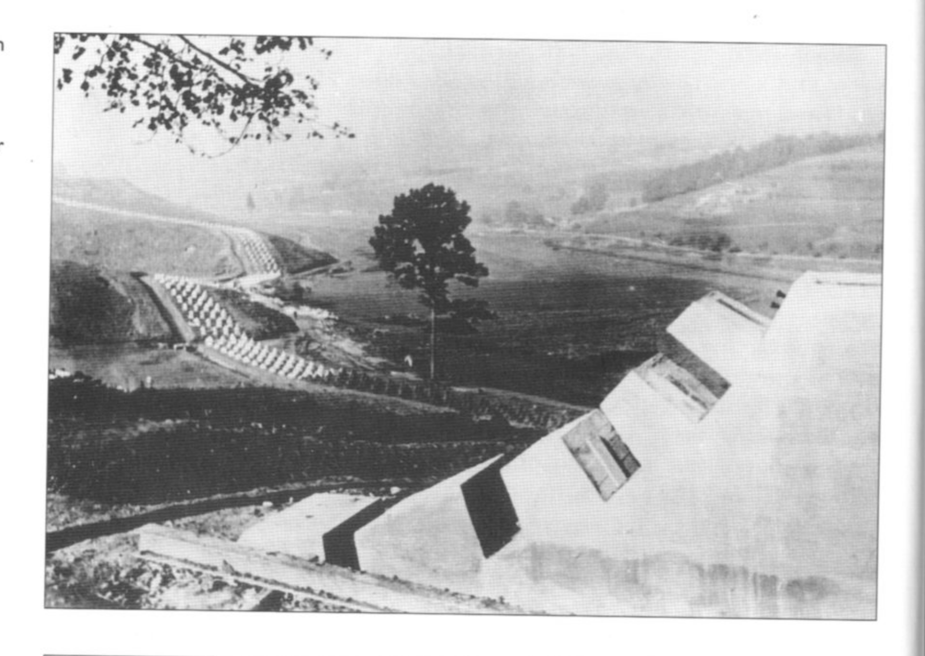
The armoured doors were cast in steel and constructed in different sizes, some tall enough to enable a man to walk through upright, but more typically they were a little over 1m in height. The thickness of the doors ranged from 20–50mm and this influenced the weight, some doors weighing well in excess of 1,000kg. The armoured doors were secured from the inside by a simple lever lock and in peacetime could be secured from the outside with a bolt and padlock.[13] Some of the doors were fitted with small apertures to enable the use of small arms and many of the external doors were fitted with a specially sealed escape hatch. This emergency exit could be used if the main door could no longer be opened. Interior armoured doors were fitted with felt or rubber seals to ensure that they were gas-tight. For practicality, the doors could be fitted to open on the left or the right by adjusting a few bolts.

The gas-tight sheet metal doors were prefabricated from two 2–3mm thick sheets of steel which sandwiched a number of steel struts that gave the door strength. Like some of the armoured doors, they were made gas-tight by the addition of rubber seals. The doors were typically 0.6–0.8m wide and 1.7–2.0m high and were sometimes fitted with a splinter-proof glass spy hole. To gain access to the armoured cupolas and observation posts, gas-tight hatches were fitted.

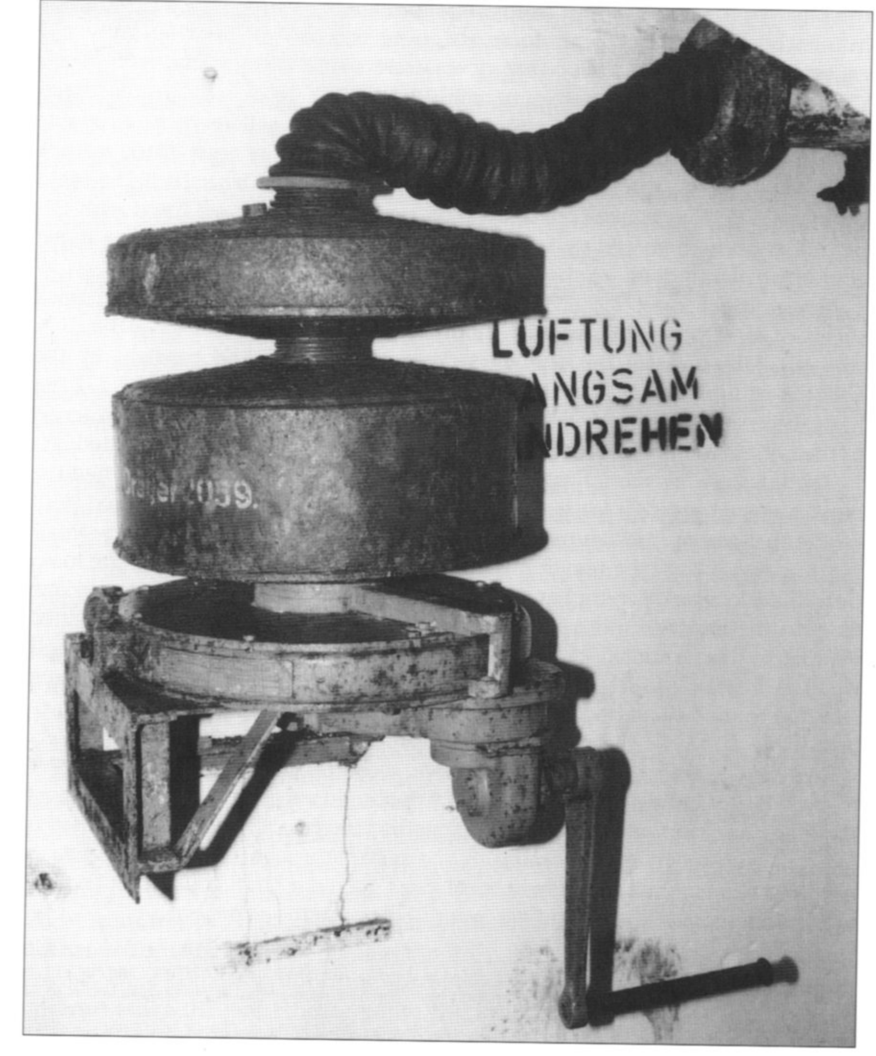
The interior and exterior gas-tight doors guaranteed the crew's safety when the bunker was completely 'closed down', but not when access was required.[14] To ensure that troops could enter and leave the shelter during a gas attack without any impact on the crew remaining inside, a gas lock was built linking the main door and the interior doors. For this system to work it was essential that only one door to the gas lock was open at any one time. A number of hand-operated ventilators were installed (depending on the size of the bunker) which drew air through a series of filters and removed any toxins. Each individual was each required to spend half and hour cranking the handle to maintain the supply of breathable air. A simple valve system ensured that excess pressure was safely vented outside without allowing toxic gas to seep in. The inlets for the ventilators were generally located on the rear wall of the bunker and were protected against hand grenades and other explosive charges by a metal grille. To identify what, if any, gas was present, the incoming air was sucked through six filter tubes which reacted when exposed to different toxic gases. A colour chart could then be used to warn the crew of the type of gas and the concentrations present.

13 Many of the keys to these padlocks were misplaced in the period between the fall of France and the Normandy invasion causing some little consternation when the Americans arrived at the German border in September 1944.

14 With the exception of the early type C and D bunkers, all the shelters of the West Wall were made gas-tight.



A recently completed *trägersperre* in the foreground with dragon's teeth stretching into the distance. A similar concrete structure would have been constructed on the other side of the road and 'H' beams – one of which is visible in the immediate foreground – would have been fixed in the recesses so preventing the movement of enemy vehicles. (Bundesarchiv)



Mindful of the physical and mental effects of poison gas in the First World War, most shelters were made gas tight. This necessitated not only sealing doors and hatches, but also providing a source of fresh air. Ventilators like the one shown were hand cranked and provided the occupants with a supply of clean air. (Author's collection)

Emergency exit hatches were also fitted to many shelters. Made of steel, they measured 0.6 × 0.8m and could be opened from the inside by means of a lever lock. To prevent attackers from forcing their way through the hatch, the emergency escape was blocked with timber and brickwork that could only be removed from the inside. The adjoining shaft was filled with sand which had to be cleared prior to escape. The shaft varied in shape – circular, semi-circular or square – and in construction: sometimes pre-formed concrete, other times brickwork.

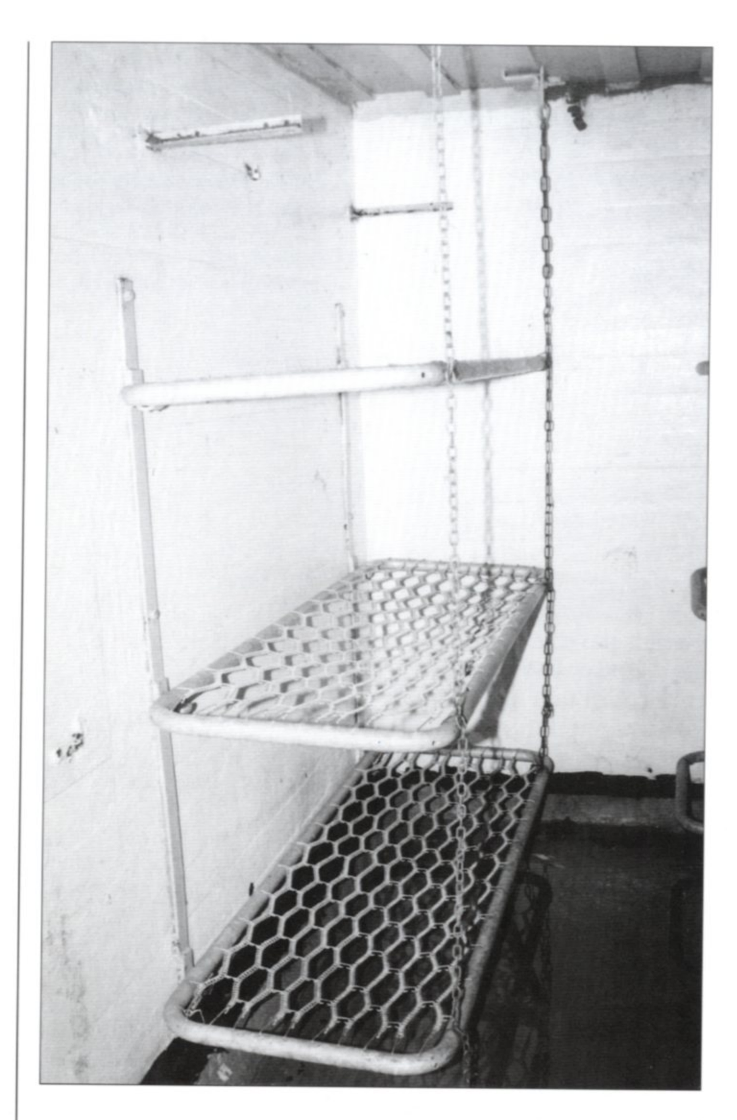
Fixtures and fittings within the various bunkers and pillboxes were, with the exception of the B-Werke, rudimentary. One of the most important pieces of equipment provided for the crew was a bed. Most of the larger shelters were fitted with bunk-beds in tiers of two or three. The frames were made of tubular steel with a wire mesh covering. On top were a sailcloth sheet, a separate mattress and a pillow. On one side the bunks were attached to the wall with a hinge and on the other side they were suspended by two chains secured to the ceiling. This arrangement meant that during the day the bunks could be folded against the wall to provide more space. The cots were just big enough for a man to lie down – 0.7m × 1.9m.

The sleeping quarters were also supplied with at least one folding table which could normally seat six men and which was supplied so that troops could eat their meals in relative comfort. Simple folding stools were provided for the ranks and folding chairs for officers. It was not possible to use the bunk-beds and the table and chairs at the same time. Limited shelf space was provided for personal equipment and clothing bars suspended from the ceiling were provided so that the garrison could hang up their uniforms. A smaller bedside shelf was provided for personal effects. Additional storage space was provided for food and drink (on occasions in gas-tight containers), for weapons and ammunition, and for helmets and gas masks. Specialist shelters were additionally provided with map tables, medical facilities, etc.

In addition to the larger items of furniture, the shelters were also provided with a range of miscellaneous equipment including bins, brooms, washbowl and mirror. A stock of tools was also provided in each bunker to enable the crew to carry out simple repairs, to ensure that doors and embrasures were clear of obstructions – grass, shrubs, trees, etc. – and, in the case of an emergency, to escape from the bunker. Tools provided included, a spade, pickaxe, crowbar, wire-cutters, axe, scythe, hammer, chisels and various saws together with 3kg of nails.

Most shelters were not fitted with purpose-built toilet facilities. This was not a problem in peacetime when external field latrines could be used, but when the bunker was 'closed down' an improvised dry closet had to be used which consisted of a butt with an aperture. After use, turfs would be scattered on the excrement. One closet was provided for every eight men. The majority of bunkers were also not provided with electric lighting, although some resourceful troops who manned the shelters during the *Sitzkrieg* (literally 'sitting war', the German term for what the Allies called the 'Phoney War' of 1939–40) fitted their own simple electric light system. Where formal (or informal) electric lighting had not been installed, troops had to rely on standard-issue petrol and battery-operated lamps (or, exceptionally, candles) which could be placed in special recesses in the wall. The number provided reflected the number of rooms in the shelter and the use to which these rooms were put, so a map room or first-aid room would have more lamps than, for example, a fighting compartment.

For heating and the warming of food (no proper cooking facilities were provided in the basic bunkers) the structures were fitted with a stove (some larger shelters were fitted with two or even four stoves). The Wt 80K stove was constructed in such a way that when the shelter was under attack it could be made completely gas-tight – preventing noxious gases getting in and smoke getting out. Sealing the stove in this way could lead to a build-up of pressure within the unit and it was constructed in such a way as to withstand this. The



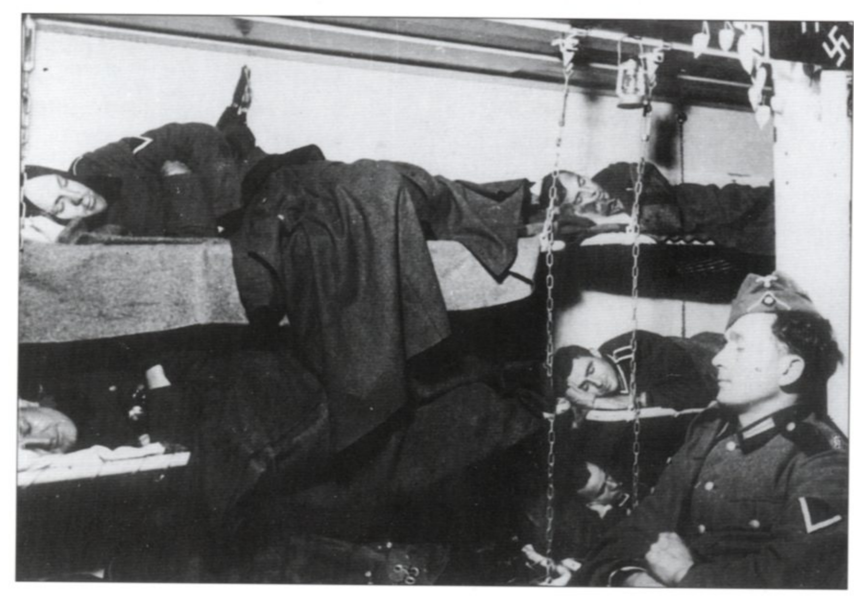
chimney section was also fabricated in such a way that explosive charges dropped down the pipe could not reach the stove and explode.

Although facilities were basic, the intention was to make all fortifications in the Siegfried Line independently defensible for seven days as a bare minimum. The larger fortifications (the B-Werke) could be defended for much longer, while the simple Type D shelters, which had not been designed to accommodate the crew for lengthy periods of time, were only suitable as fighting positions and so were not fitted with a ventilation system, beds or furniture.

To enable the crew to remain in their shelter for this period of time, it was crucial that they had access to a supply of fresh water. Some shelters were fitted with wells or pumps, but most had to suffice with a diverse range of containers from jugs to gas-proof containers. These had to be replenished from local sources, be they wells, springs or a local house. This was far from satisfactory and troops complained bitterly about the inconvenience and danger of having to collect water. Efforts were made to establish independent supplies for bunkers using pipe systems but it is unclear how far this work had progressed.

Another priority was food. Normally, troops stationed in the bunkers and pillboxes would be regularly supplied with food, but the shelters were additionally provided with emergency stores. These included tins of meat and fish, processed cheese, crispbread, coffee, tea, sugar, salt and chocolate and were designed to sustain the men for a week.

ABOVE The crew of the West Wall bunkers were afforded few luxuries, but most shelters were fitted with beds. The three tiered bunk beds were suspended on one side by chains fixed to the ceiling and on the other by hinges so that they could be folded against the wall when not in use. The steel framework was fitted with a wire mesh over which was stretched a sailcloth. A mattress and pillow were also provided. (Author's collection)



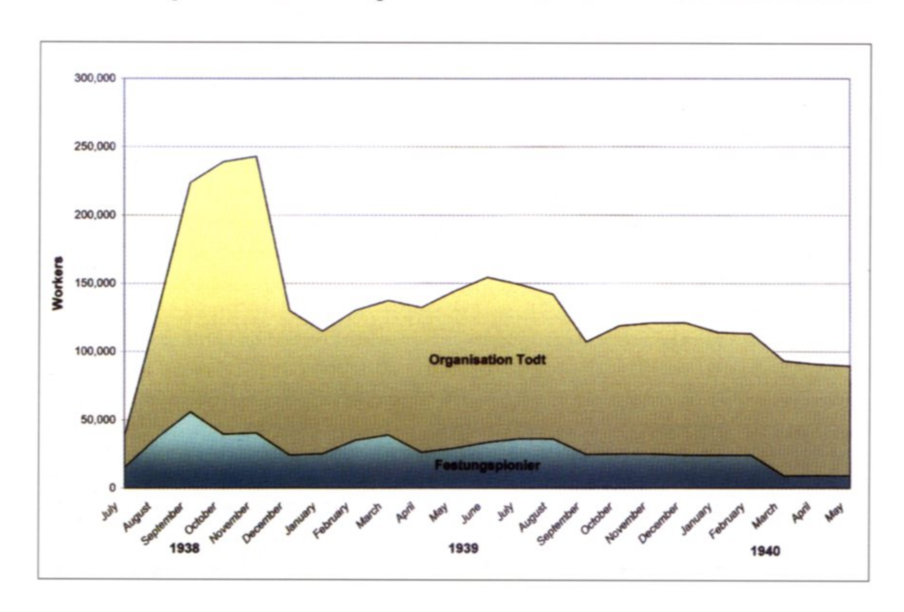
RIGHT Troops were provided with simple three tier bunk beds to sleep on which were designed to be practical rather than comfortable. Lighting was also often basic – here provided by a simple oil lamp. These troops are resting after an exercise during the Phoney War in February 1940. (Bundesarchiv)

The living site

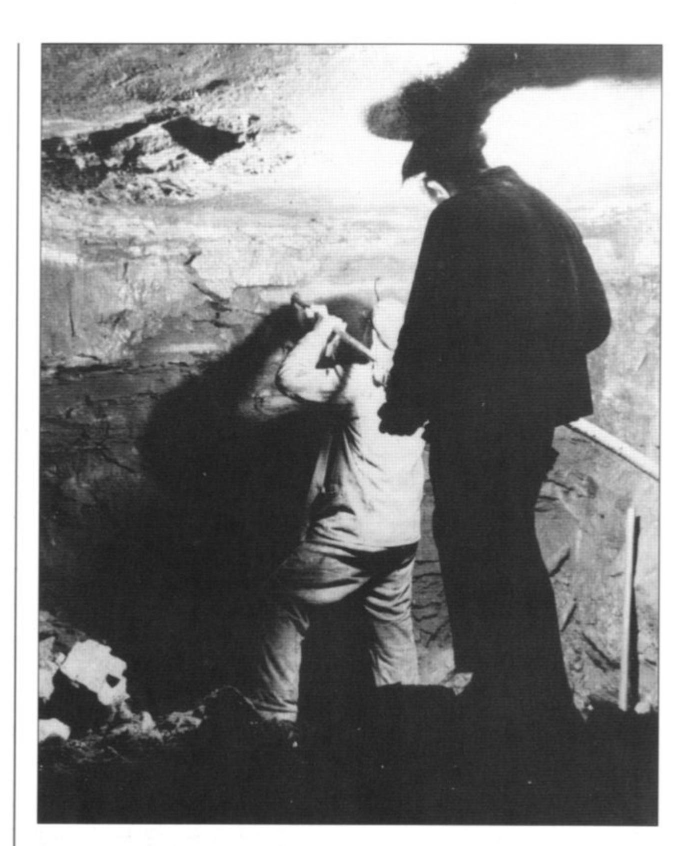
For the first four years of the West Wall's life it was inhabited not by soldiers, but by labourers, overseers and engineers. This was especially true in the period following Hitler's decision in May 1938 to increase the scale of the building programme. Initially men were diverted from work on the *Autobahnen*, but this failed to satisfy the necessary manpower requirements and it was decided to conscript workers. The net was cast far and wide and caught a ragtag bunch of shirkers and ne'r-do-wells. These included the long-term unemployed, but also elements of society that were deemed 'undesirable', including petty criminals and political prisoners. The influx of these 'workers' concerned both the military and local communities. The former worried about the quality of work that these men would produce and the influence that they would have on the more conscientious workers, while the latter were concerned that these unsavoury individuals would upset the balance of life in small rural communities.

The conscripted workers were also not overly enamoured of the idea of working on the West Wall, often having to travel far from home and family, and working long, hard days for little pay. Reveille was typically sounded at 4.00am. Men then had time for ablutions and breakfast before being transported to their place of work. The working day was anything from ten to 12 hours long with an hour for lunch. 'Last Post' was sounded at 10.00pm. The workers were entitled to only one day off every two weeks, sometimes every three weeks. Some workers were so aggrieved with the long hours that they refused to work. This prompted a swift and tough response from the state which sent in the police to break up the strike, threatening the malcontents with a stay in the concentration camps if they did not return to work. Recognising that the alternative was far worse than labouring on the defences they were forced to accept the miserable working conditions, but they became increasingly tired and accidents increased, as did anti-social behaviour.

The plight of the workers was compounded by the poor pay that they received, which was further exacerbated by the fact that payments were often late or wrong – or both; the simple result of a failure to increase the number of



The total number of workers employed on the West Wall in the period from July 1938 to 1 May 1940.



Some of the defences of the West Wall – for example the tunnel systems – were bored into solid rock. This was dirty and dangerous work and those who undertook it were given special pay and allowances. (Bundesarchiv)

pay clerks in line with the expanded labour force. Those workers that had been seconded from companies[15] were particularly aggrieved at their new wage and made their feelings known through official channels. As a result they picked up additional payments to compensate for the difference between their previous wage and what they now received. Additionally, they received separation payments and, where applicable, supplements for long hours, dangerous or onerous work and for poor living conditions. Yet, in spite of these incentives, few workers were prepared to continue working on the western defences when their period of conscription ended.

The number of men required to work on the new building programme presented a considerable accommodation problem for the Organisation Todt. Barracks were built to cater for the influx of workers, but the manufacturers of these prefabricated units were not geared up to meet the new demands placed on them. The Deutsche Arbeitsfront (DAF) which supervised the barrack camps was forced to rent accommodation from the private sector. Rooms in public houses and clubs were hired and equipped with beds and furniture. Where necessary, additional toilet blocks were built to meet sanitary requirements. The owners were paid a peppercorn rent, but they had a captive audience for the sale of their drinks. Schools, sports halls, factories and farms were also requisitioned to meet the need for sleeping space, with field units deployed to feed the new lodgers. Even then there was still insufficient room for all the workers. Some men were forced to find their own board and lodging and received recompense in the form of an allowance.

The accommodation problem was eventually solved and sufficient wooden barrack blocks were built. Each camp consisted of three blocks; one for the men, a block that housed the kitchen, dining area and ablutions, and another block for officers, administrative and medical staff. However, life in the camps was far from satisfactory, especially in the winter when the lack of proper heating and hot water made life almost unbearable. The failure to provide communal areas and entertainment also led to disturbances. Gradually the situation improved; entertainment was provided by the KdF (Kraft durch Freude, or 'Strength through Joy') organisation, as were communal areas. Meals were served three times a day.

The vastly increased programme of work promulgated by Hitler meant that it was no longer possible for local construction firms to cope with all the work. It was therefore necessary to bring in much bigger national construction firms. These companies were given 'cost plus' price contracts which meant that they could recoup all their costs plus a profit on top. For the companies this was risk-free guaranteed income with no incentive for them to find more effective and efficient ways of working. Costs began to spiral out of control as companies sought to claim exorbitant amounts of money. In October 1938 steps were taken to address the situation and some 400 inspectors were employed to check invoices and work procedures. By the end of 1938, 95 cases were under review, which ultimately led to 14 arrests.

It became increasingly clear that the root of the problem lay with the pricing mechanism and in January 1939 a new contract model was introduced using

15 Companies were more than happy to let workers go because the Organisation Todt paid them premiums.



Workers on the West Wall enjoy their meal, washed down with beer, 'al fresco'. The barracks to the rear would have served as their sleeping quarters. Despite the propaganda images living conditions were difficult especially in the winter. (Bundesarchiv)

fixed prices. This ensured that companies reduced their costs to a bare minimum, but it also led to the use of inferior-quality materials and poor-quality workmanship. Again the quality of the defences suffered.

Despite the problems, by the time of the Munich crisis of September 1938 the majority of the West Wall defences planned for the *Limesprogramm* had been completed. As the diplomatic tension grew, men from four regular divisions were ordered to occupy the defences. These units were 'reinforced' – much to the chagrin of the German High Command – by 300,000 poorly armed and trained labourers who had been pressed into service from the *Reichsarbeitsdienst*.

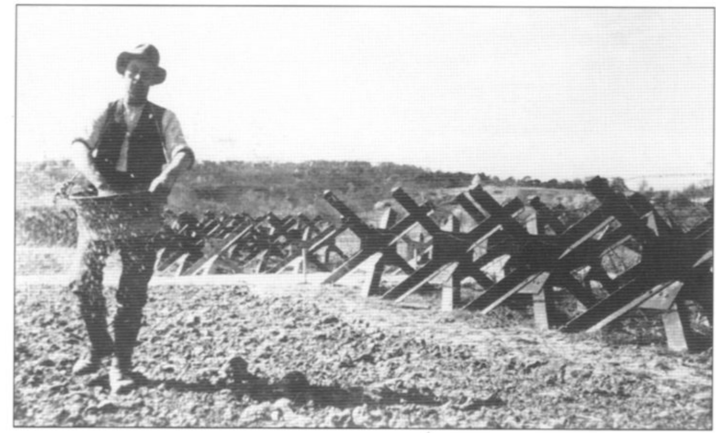


A finished German workers camp complete with Nazi flags. Many of the barrack blocks were not ready for the influx of workers in 1938 and they had to be placed in temporary accommodation. Facilities were rudimentary and caused considerable anger among the conscripts. (Bundesarchiv)

As the shuttle diplomacy continued these untrained men sat in their cramped, damp and cold bunkers with no sanitary facilities and no electric light. With little to do they could not but fail to think about their counterparts ensconced across the border. The defences of the Maginot Line, unlike the West Wall, were permanently manned by special fortress troops. The fortress garrisons, now put on high alert, enjoyed good basic amenities but also gymnasiums, sun rooms and light railways to transport them around. For these troops the increased tension of the Munich crisis was far less burdensome because the defences had been designed for this eventuality and the men were trained to meet it. In the end diplomacy prevailed, the alert state was downgraded and the troops could relax, while across the border the labourers were able to return to work on the defences which Hitler now ordered were to be extended and strengthened.

Following the outbreak of war in September 1939 the defences were again manned in accordance with Hitler's War Directive 1, and again it was only possible to deploy a skeleton force: eight regular divisions supported by 25 reserve divisions. No tanks could be spared because they were all committed to the Polish campaign and only enough ammunition for three days' fighting was available. Hitler gambled that, as in the previous year, the French would not





act. It therefore came as something of a shock when the French launched the so-called 'Saar Offensive' on 7 September. However, the attack was a weak affair and lacked commitment. Some territory that the Germans had evacuated was captured but the defences of the West Wall were not threatened save for a few desultory shots from French forts. The French troops were eventually withdrawn to their prepared positions and an uneasy stand-off ensued that was to last until May 1940. Men on both sides became bored. With little prospect of action some troops took the opportunity to spruce up their bunkers with plants; others used the open spaces around their shelters to grow vegetables. As autumn turned to winter the men occupied themselves as best they could, but the weather was bitingly cold and they could do little more than concentrate on keeping warm.

ABOVE TOP Men of the RAD, a para-military organisation, march back to their camp in October 1938. The men hold their shovels stiffly against their shoulders like rifles and sing as they march. (Bundesarchiv)

ABOVE BOTTOM In the absence of dragon's teeth *Hemmkurvenhindernis* (curved steel barriers) or *Tschechenigel* or Czech hedgehogs as in this case were used for anti-tank defence. In spite of the war and the proximity to the front line a farmer sows seed. April 1940. (Bundesarchiv)

Following the defeat of France the defences of the West Wall were mothballed. Those that were incomplete were demolished, often by prisoners of war who filled the manpower gap left by workers and engineers who were now needed at the front to build roads and bridges. Other bunkers, pillboxes and forts were retained because, as von Rundstedt noted, 'One would never know when it might not be urgently needed.'[16] That said, all the weapons were removed, as were other non-integral items of equipment, and were sent to store (many to be used later in the Atlantic Wall).

With the majority of engineers away on active service it was necessary to reorganise the remaining personnel so that the defences could be properly maintained. Five fortification administration areas were established, each of which was divided into supervisory groups and sub-groups. Each sub-group was made up of a guard and two fortification workers, normally recruited from the local population, and they were responsible for the care and maintenance of

16 Westphal, S *The German Army in the West* (Cassell, London, 1951), p.74.



By the spring of 1940 it was clear that France was not going to attack Germany. Here troops relieve the boredom of the Phoney War by landscaping the spoil around their bunker. (Bundesarchiv)



With the war in the west over, the garrison of this B Werk take the opportunity to tend their vegetable plot which has become a little overgrown. Other troops take the opportunity to clean and air their clothes. (Bundesarchiv)

40–50 positions. These individuals were required to make regular checks on the defences and take any remedial action necessary, but because they invariably had full-time jobs their duties were often neglected. The structures fell into disrepair while others were used for purposes other than that originally intended – one pillbox became the foundation for a chicken-house and surrounding trenches provided a convenient place for over-wintering potatoes.

More remote shelters were given to the local communities in whose parish they resided. Within reason they could be used for whatever purpose was deemed necessary – air raid shelter, cellar, forest shelter, etc. – but only on the

proviso that they were maintained. Again the road to hell is paved with good intentions and many were effectively abandoned; they became overgrown, damp and dusty and the keys were misplaced.

Not until the summer of 1944 did the bunkers and pillboxes of the West Wall again see action. Now, however, the manpower situation was very different to that which had existed in the summer of 1939. The cream of the *Wehrmacht* had either been killed, wounded or captured in the retreat from Normandy, or in the meat grinder that was the Eastern Front. All that remained to man the defences were men of the 'People's Army' who were conscripted into the *Volks Grenadier* divisions. Often these men were too young or too old to serve in the regular army, or suffered from a minor ailment or disability and had therefore been excused active service. All were now sent to the front to man the West Wall positions. On one occasion a captured German prisoner admitted that he had been ordered to prepare a bunker for use by regular units only to then find himself pressed into service, exchanging a brush for a rifle. A number of women were also captured in enemy bunkers but it is unclear whether they were defending the position or simply taking shelter there. Certainly the tunnels of the Gerstfeldhöhe at Niedersimten were used by the local population as a place of sanctuary during the Allied bombing raids. They even established a makeshift church in an unfinished tunnel.

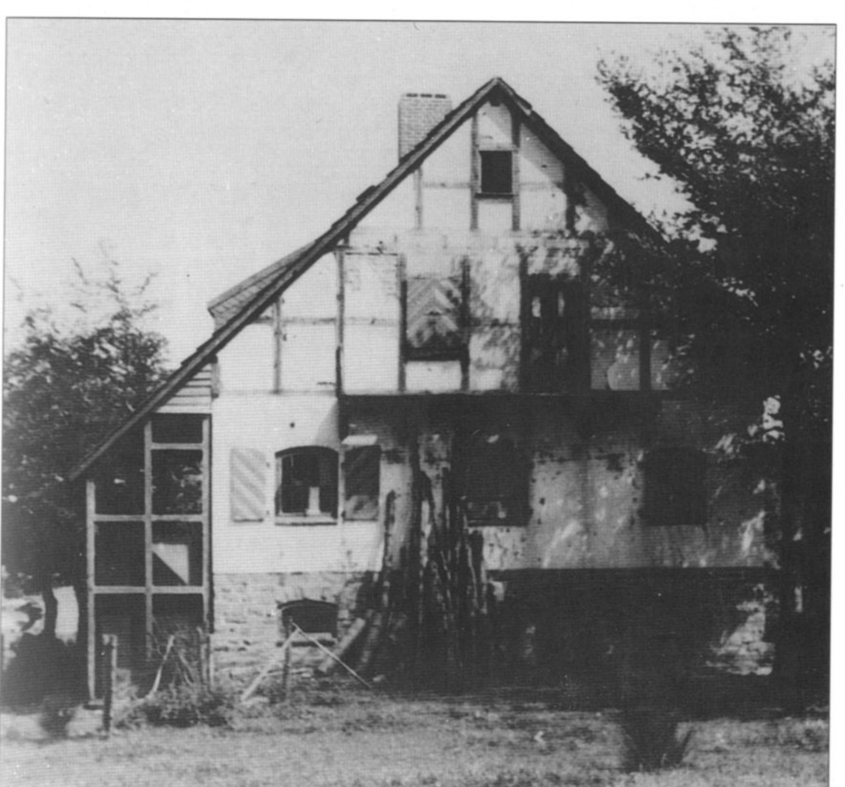
The experience of men in the pillboxes and bunkers was grim. They were often cold and damp and despite the thick concrete that surrounded them, they did not always provide the best fighting position. The crenellated loopholes tended to funnel enemy fire towards the unfortunate defender. Indeed, one German officer interrogated after being captured admitted that machine gun crews had refused to open the loophole for fear of being shot. The lack of sanitary facilities also made living in the shelters uncomfortable, especially when the position was under attack. Enemy fire made it almost impossible to leave the confines of the shelter to seek relief and so the dry closets had to be used. This added to the already rich smell of sweaty men fighting in a confined space.

Often the defenders of the pillboxes chose to surrender after coming under attack, especially from American tanks, tank destroyers or self-propelled guns.[17] As an interested observer noted, 'The Krauts wouldn't come out when we talked to them. So we pulled the TD [tank destroyer] right up to the back of the steel door we had located by now and that old Wump gun fired about six rounds and blasted the door in and you ought to have heard them wanting to come out. You ought to have heard them yell and moan and scream and yell, "Kamerad!"... They started to come out and you never saw such a mess. Every one of them was wounded in five or six places from pieces of concrete and steel.' So wrote Ernest Hemingway in an article he dispatched for Collier's in October 1944.

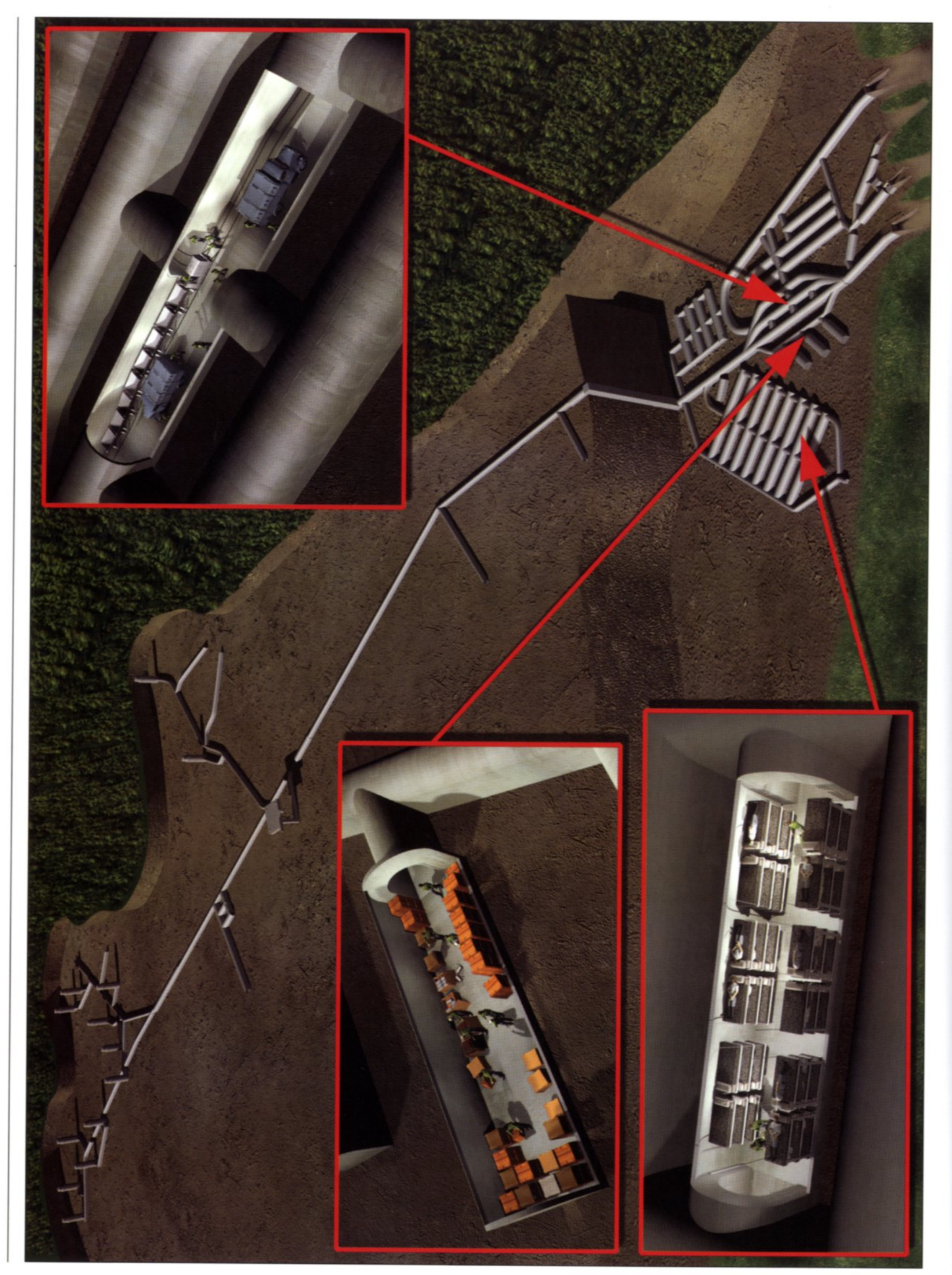
Others surrendered without a shot being fired. In one engagement a resourceful GI, having captured one pillbox, used the internal telephone to call up the defenders in the next position and convinced them to lay down their arms. Such tactics were not always successful. The defenders of one bunker were implored by a captured compatriot to surrender. They refused, so a bulldozer was called forward and the incumbents were buried alive. Elsewhere, stubborn opposition was overcome by an explosive charge detonated on the roof of the shelter, which, if it did not kill the occupants, left them badly injured and concussed. After failing to dislodge some particularly obstinate defenders in one pillbox, engineers packed 450lb of TNT into the recess formed by previous explosions and detonated the charge. Not surprisingly, this had the desired effect. The ten defenders emerged, somewhat dazed and confused but with their pride, if not their eardrums, intact.

17 The Americans had learned that the powerful 155mm gun of the M12 SPG had a devastating effect on concrete bunkers when used over open sites.

This bunker at Steckenborn sustained a massive hit just to the side of the aperture which penetrated the two metre thick reinforced concrete wall. American tank and SPG crews were instructed to target the doors and machine gun apertures which were recognised as being the weakest part of the structure. (Public Record Office)



To make Allied reconnaissance more difficult, the Germans often went to extraordinary lengths to conceal the bunkers of the West Wall. This example at Hechelsheid was constructed as part of house. The house was actually inhabited and was still used after the war. (Public Record Office)



LEFT **The Gerstfeldhöhe Tunnel System at Niedersimten**

The Gerstfeldhöhe tunnel system at Niedersimten, near Pirmasens, was planned to be a key defensive installation of the West Wall. A series of interconnected bunkers and pillboxes were to be constructed that would dominate the Trulben valley which was a natural avenue of attack from France. These positions in turn were to be linked by a 68m high elevator shaft to a further tunnel system that provided a safe haven for both the personnel and ammunition. A light railway was planned to run from the entrance at Niedersimten to the lift while another linked up the various fighting positions.

By the time construction work was suspended following the defeat of France around three million Reichsmarks had been spent on the project. Work was restarted in 1944 but only on a very limited scale. Its main wartime contribution was to act as an air raid shelter for local residents and after the war served as a depot for US Army stores.

Today the Gerstfeldhöhe is home to the Westwall Museum. One thousand metres of tunnels are open to the public with write-ups and exhibits.

The bunkers and pillboxes did though provide effective shelter from artillery and aerial bombardment. Not only was it difficult to locate the enemy positions (even after the war engineers overlooked a number of bunkers); it was even more difficult to hit them – and when they did the impact had little effect. Troops of the 4th Infantry Division, on witnessing an air attack on enemy pillboxes noted that, 'The bombs hit smack on top of the seven-foot-thick concrete-and-steel pillboxes. From our angle we could see no damage at all. No roofs were caved, no huge cracks appeared. Probably the Jerries had hellish headaches from concussion, but nothing was visible. All the great show did was raise dust.'[18] On another occasion a prisoner was interrogated to ascertain the effect of Allied bombing, and could only respond by asking, 'What bombing?'

18 Astor, G *The Bloody Forest. Battle for the Huertgen: September 1944–January 1945* (Presidio Press, Novato, 2000), p.51

Operational history

During the 'Phoney War' of 1939 and 1940 the defences of the West Wall were largely untested. The so-called 'Saar Offensive' launched by the French immediately after the declaration war saw some units advance across the German border and capture two pieces of enemy territory. Newspaper reports at the time hailed this a great victory, but the land had been evacuated by the German authorities and was of no strategic importance. Unwilling to attack the West Wall proper, the troops were ordered to dig in and await further orders. The fighting now began to take on a routine that was to characterise this period of the war. German positions were shelled and reconnaissance patrols probed the German lines, often with disastrous results as anti-personnel mines took their toll. On one occasion a German outpost heard a mine explode and an investigation was ordered. The patrol made a macabre discovery: a severed leg, complete with French army boot and gaiter. German engineers took advantage of the relatively peaceful interlude to build barricades, lay more mines, build log bunkers and complete work on the main defences. However, as time passed it became clear that the French would not launch a full-scale attack. Indeed, in the middle of October 1939 German patrols found that the small army of occupation had abandoned its gains and retreated back into France and the relative safety of the prepared positions along the Maginot Line.

The West Wall, as it had been designed to do, had deterred France from launching a full-scale attack. With his western flank secure, Hitler could concentrate all his efforts on the defeat of Poland. Even before the Polish surrender in October, Hitler was able to gradually move troops to the west to man the lightly held defences and later to prepare for the spring campaign. The western democracies had missed their chance to smash the Siegfried Line, much to the bemusement of the German High Command. General von Mellenthin noted at the time that, 'The more I looked at our defences, the less I could understand the completely passive outlook of the French.'[19] Indeed, the total lack of warlike intent was such that if the war diary of one German engineer unit is typical of the rest, it would seem that mines of their own laying were the cause of most German casualties during this period.

Following the fall of the Low Countries and the defeat of France the defences of the West Wall were largely abandoned. Weapons and fittings were removed and placed in storage and incomplete bunkers demolished. All efforts now went into the building of the Atlantic Wall. Not until the summer of 1944 was serious consideration given to renovating the western defences. By this time the Allies had broken out of the Normandy bridgehead and were advancing across France. On 25 August Paris was captured and Allied troops paraded down the Champs-Elysées.

A little over two weeks later, American forces were at the German border and were faced with only two obstacles – one man made and one natural – between them and victory. The latter obstacle, and arguably the more formidable of the two, was the River Rhine, which snaked from its source in Switzerland all along the German border and into the Netherlands before draining into the North Sea. Overcoming this obstacle, swollen with the autumn rains and with all the bridges sure to be destroyed by retreating German forces, would require a well-planned set-piece attack.

19 Whiting, C *West Wall: The Battle for Hitler's Siegfried Line* (Spellmount, Staplehurst, 1999), p.14.

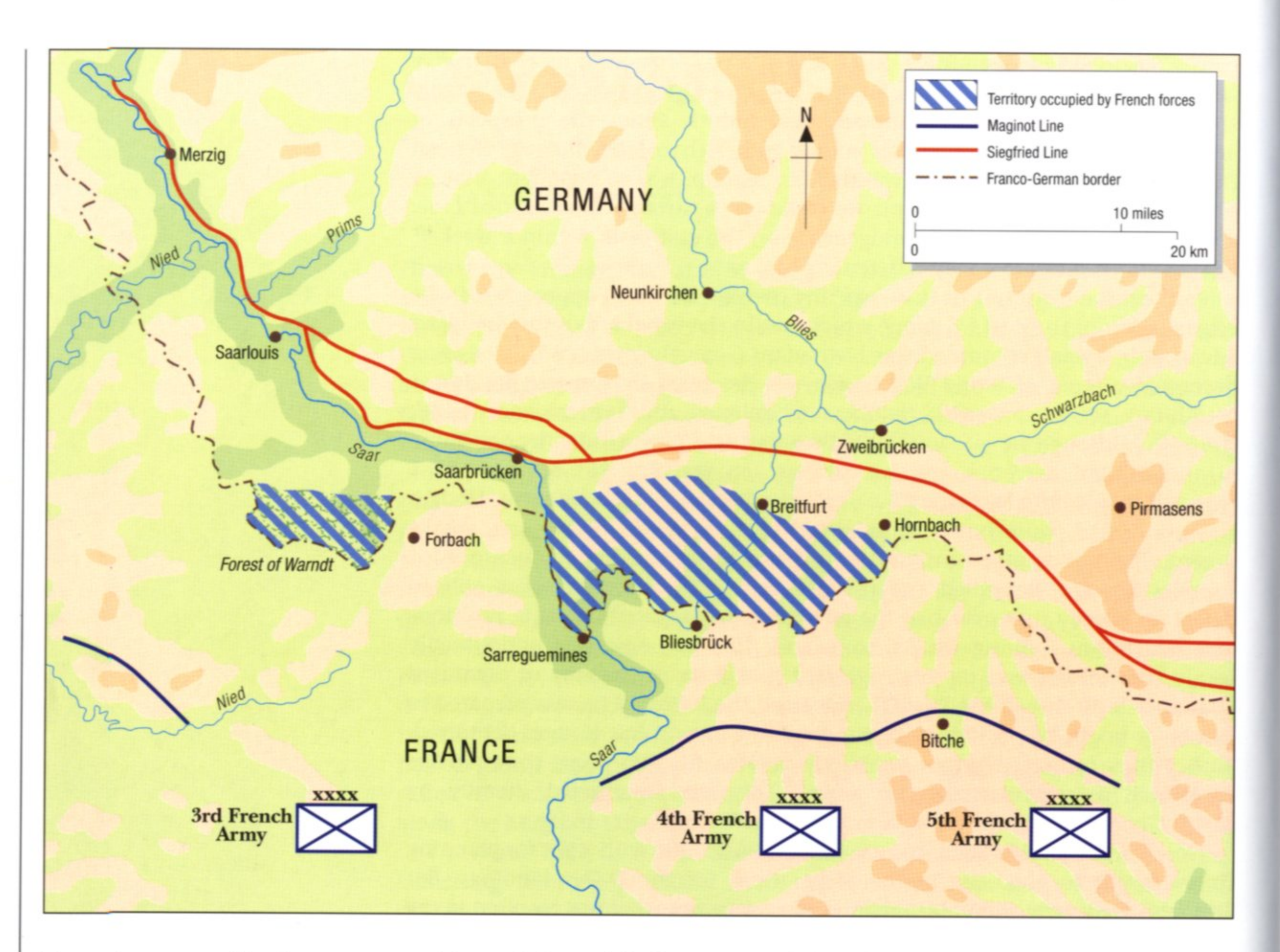
The Siegfried Line seemingly posed less of a problem. Built more than five years previous and abandoned in the interim, the defences were largely obsolete. The Allied High Command was bullish about the prospects of breaching the outmoded defences sooner rather than later. Indeed, General Omar Bradley, commander of Twelfth Army Group, was so confident that he predicted, '...with an all-out effort we could crack through the Siegfried Line, reach the Rhine and establish bridgeheads on the east bank within a week.'[20] The reality was to prove very different.

Part of the reason for this was the overly cautious approach of the commanders of the First US Army, which was in the vanguard of the American advance. In overall command was Lieutenant-General Courtney H. Hodges, a decorated veteran of World War I who was described by General Bradley as 'a military technician' with 'faultless techniques and tactical knowledge'. However, although he was undoubtedly a first-rate commander, he was more measured than maverick and his strategy on reaching the Siegfried Line reflected this. Before launching a co-ordinated attack on the defences, Hodges was minded to pause briefly. This would give his troops time to rest, make urgent repairs and, importantly, allow the support services to get much-needed supplies forward. Refreshed and rearmed, his units would be better able to defeat an enemy that now had the advantage of prepared concrete positions and which was fighting for its homeland. Hodges' logic was undoubtedly sound, but intelligence reports suggested that little in the way of organised resistance lay between the First US Army and the Rhine. If he was prepared to gamble it might be possible to realise Bradley's dream. But Hodges demurred. Rather than 'pursuit without pause' he ordered his two corps commanders to launch a 'reconnaissance in force'. This was interpreted literally by Major-General Leonard Gerow, commander of V Corps.

Gerow was a level-headed, conscientious commander with a gift for planning that was put to good use in the preparations for the D-Day landings. But although these were admirable qualities, they were not what was required in the more fluid environment that characterised the fighting in the summer of 1944. Opportunities for a decisive breakthrough were squandered as the advances of the 4th and 28th Infantry Divisions were halted when enemy resistance stiffened, despite making good progress through the defences. More critically, the advance of the 5th Armored Division was also broken off despite early success as caution rather than courage won the day. Envisaged as little more than an operation to reconnoitre the enemy defences, Combat Command 'R' found that the West Wall on its front was unmanned. Enemy units were rushed forward to plug the yawning gap, but they were unable to stop the tanks and men of the 'Victory' Division and by 15 September they were 6 miles inside Germany with the defences of the West Wall far behind. By chance the division had struck at the boundary between the German First and Seventh Armies and Army Groups 'B' and 'G'. Von Rundstedt soon recognised the danger and desperately tried to contain the incursion by throwing all the reserves at his disposal into the fray. It proved to be enough.

Concerned about the strengthening resistance and the parlous supply situation, Gerow halted the advance and gradually withdrew his troops to a more defendable position. The opportunity was now gone, but it is interesting to speculate as to what might have happened if Gerow had been a little less circumspect. To Westphal, von Rundstedt's Chief of Staff, writing after the war the conclusion was clear: 'If the enemy had thrown in more forces he would not only have broken through the German line of defences which were in the process of being built up in the Eifel, but in the absence of any considerable reserves on the German side he must have effected the collapse of the whole West Front within a short time.'[21] A maverick like Patton might have gambled

20 Bradley, O.N. and Blair, C *A General's Life* (Sidgwick and Jackson, London, 1983), p.321.
21 Westphal, S *The German Army in the West* (Cassell, London, 1951), p.174.



The territory captured by the French in the so-called 'Saar Offensive' of September 1939. The French made no attempt to attack the West Wall.

and in so doing might have succeeded in changing the whole complexion of the war in Europe. Instead, Patton was left kicking his heels in the south, starved of petrol and ammunition as the meagre supplies were given to the British and American forces further north in what was seen to be the main theatre of operations.

One commander who possessed a little of Patton's élan was Major-General Lawton Collins. He commanded VII Corps on Gerow's northern flank and faced the heavily fortified city of Aachen. From the outset he made it clear to Hodges that he was unhappy with the decision to pause at the German border and it was at his insistence that Hodges agreed to a reconnaissance in force. In true Patton fashion Collins interpreted this order in its broadest possible sense. He knew full well that to delay would heighten the possibility of a protracted battle to overcome the defences and seize the city which, if captured, would be the first German city to fall to the Allies.

Keen to avoid house-to-house fighting, and an American 'Stalingrad', Collins decided to strike to the south of the city. The main thrust of the attack was to be delivered by the 3rd Armored Division. After some initial difficulties the tanks smashed through the two bands of pillboxes and into the open country beyond. Eager to exploit the breakthrough, Collins ordered the 9th Infantry Division to attack. Advancing to the south of the 'Spearhead' Division, the troops of the lead units found their path blocked by a series of pillboxes manned by regular German troops. With casualties mounting and supplies low, the advance had to be halted. More significantly, the 3rd Armored Division, with no prospect of reinforcements to press home the attack, was ordered to suspend its advance and eventually had to pull back from its exposed position. The German High Command's so-called 'miracle of the west' had begun.



Men of the 39th Infantry Regiment (9th Infantry Division) pass through the Siegfried Line near Roetgen. In the immediate foreground are iron girders that were placed in the recesses of the *trägersperre* to block the road. To the sides are dragon's teeth and improvised anti-tank obstacles which are simply wooden posts rammed into the ground. (US National Archives)

Nor was this a short-lived miracle; by the middle of December the Allies had made little further progress. It would be wrong to suggest that this was purely due to the western defences; logistical difficulties also played a part, as did a continuing lack of adventure among senior American commanders. General Corlett, advancing on Collins' left, and mindful of the experiences of V and VII Corps earlier in the month, delayed his attack until he had sufficient supplies of ammunition and fuel and the weather was suitable for tactical air support. As such, it was not until 1 October that Corlett ordered the 30th Infantry Division and the 2nd Armored Division forward.

This brief respite was not wasted, however. General Leland Hobbs, com-mander of the 30th Infantry Division, took this rare opportunity to withdraw his troops from the line in rotation for two days of intense training in the art of attacking fortified positions. This is not to suggest that he had been in any way remiss in the past; men of the division had received specialist training both in the United States and the UK. However, rates of attrition had been such that much of the know-how had been lost. To fill this void, new recruits and veterans alike were given basic training in how to use the specialist weapons that they had at their disposal, including bazookas, flame-throwers and 'beehive' charges. They were also instructed in how best to assault a pillbox and were given the opportunity to put these weapons and tactics into practice.

Poor weather delayed the jump-off until 2 October when the cloud lifted sufficiently to allow air strikes to be delivered. These were largely ineffectual, but undaunted the infantry crossed the Wurm river and advanced into the Siegfried Line proper. Drawing on their recent training they successfully dispatched a number of pillboxes, but with armoured support bogged down they were forced to dig in for the night.

The tanks of the 2nd Armored Division – 'Hell on Wheels' – were now pushed into the tiny bridgehead. Armour and infantry now worked in concert to eliminate the pillboxes on their front. The tanks would either target the loophole or the door of the structure before the infantry attacked to deliver the *coup de grâce*. Often less conventional means were equally successful. On one occasion an NCO of the 2nd Armored Division used a telephone in a captured bunker to call the occupants of an adjacent pillbox and convince them to surrender – they did! Such bravado and not a little bravery meant that in less than a week a substantial bridgehead had been secured from where further operations could be launched. Indeed, Hobbs was confident enough to declare, 'I entertain no doubts that this line is cracked wide open.'[22]

Hodges tended to concur with his subordinate and he ordered a daring pincer movement to encircle Aachen. The 30th Infantry Division – 'Old Hickory' – would break out of its bridgehead and head south while men of the 1st Infantry Division struck north. On 8 October troops of the 'Big Red One' jumped off and within two days they had reached their final objective, capturing a number of pillboxes without a shot being fired. The German High Command was greatly alarmed by this development and did everything in its power to prevent the pincer being closed, even ordering a series of raids by the shattered *Luftwaffe*.

22 MacDonald, C.B. *United States Army in World War II The European Theater of Operations The Siegfried Line Campaign* (Center of Military History, United States Army, Washington DC, 1984), p.279.



An American Sherman tank follows the path blasted by US Army Engineers during the fighting around Aachen in September 1944. The Americans tended to attack road blocks rather than sections of dragon's teeth because destroying the teeth was dangerous and time consuming. (Imperial War Museum)

This desperate measure failed to dislodge troops of the 1st Infantry Division and although they blunted Hobbs' initial attack, a change of plan saw the 30th Infantry Division make contact with their compatriots on 16 October. With the encirclement complete, it was only a matter of time before the beleaguered city fell; on 21 October the inevitable happened and the garrison capitulated, much to Hitler's chagrin.

Elsewhere, the Americans enjoyed less success. The 9th Infantry Division was ordered to capture the strategically important village of Schmidt, an operation which, if successful, would outflank the defences of the Monschau corridor – one of the key avenues of advance through the Siegfried Line. Unbeknown to the Allies, Schmidt had been identified by the German High Command as a jump-off point for the imminent Ardennes counterstroke and as such would not be given up lightly. The village was captured but a strong German counter-attack ensured the occupation was short-lived and on the same day as Aachen fell the battered remnants of the 9th Infantry Division were expelled from the village. The attack was called off, the division was withdrawn from the line and its place taken by another veteran of the Siegfried Line campaign, the 28th Infantry Division.

For General Dwight Eisenhower the reason for his forces' inability to pierce the West Wall was clear, as was the solution. In a note to his senior commanders on 28 October he noted, 'Limitations of maintenance and transportation prevented our over-running of the Siegfried Line before the enemy's resistance stiffened. We now have to deploy superior forces in the forward area and furnish them adequate resources for intensive fighting.'[23] To the men of the 28th Infantry Division – the inauspiciously named 'Bloody Bucket' Division – this meant a frontal assault on Schmidt with the 5th Armored Division attacking the Monschau corridor in the hope that this two-pronged attack would deliver success. It did not. The defences were fully manned by a determined enemy and they took a terrible toll on the attackers. By the middle of November the attack had to be suspended – the 28th Infantry Division alone having suffered more than 6,000 casualties.

With the smoke having barely cleared around Schmidt, the focus of the attack turned to the north where the newly arrived 84th Infantry Division, in concert with the British 43rd (Wessex) Infantry Division, was tasked with capturing the town of Geilenkirchen. The town had been turned into a veritable fortress and veterans of the 15th Panzer Grenadier Division, which had fought in North Africa and Italy, manned the defences. Success for a 'green' unit like the 84th Infantry Division was likely to be costly, and so it proved to be. Some 2,000 men were killed, wounded, captured or listed as missing in the attack on the town. Tragically, many of the casualties might have been avoided if the infantrymen had received specialist training, or at least been given the benefit of lessons learned by other experienced units. Instead, they often attacked fortified positions without support from engineers or direct fire support from tanks and self-propelled guns and suffered accordingly. Indeed, had it not been for the 'funnies' – British tanks specially designed to tackle such defences – the casualty figures might have been higher still.

23 Chandler, A.D., Jr., (ed.) *The Papers of Dwight David Eisenhower The War Years: IV* (The John Hopkins Press, Baltimore, 1970), p.2257.

The bloody reverse suffered by the Allies in the autumn of 1944 had been due in no small part to the defences of the West Wall. However, although the fortifications around Aachen were undoubtedly strong, it was not the most formidable part of the line. This was located to the south around the Saar and lay between Patton's Third Army and the German heartland.

Before attacking the main defences of the Siegfried Line there was the small matter of the 'Siegfried Switch Line' which ran from the Moselle river in an easterly direction to Orscholz and which provided its alternative name – the Orscholz Switch Line. It was designed to prevent France outflanking the main defences of the West Wall and was built in a similar fashion to its larger cousin. When the tanks of Patton's 10th Armored 'Tiger' Division reached the line in the second half of November, Patton gave little credit to such defences and confidently predicted that given the supplies he would '...go through the Siegfried Line like shit through a goose.'[24] The truth was somewhat different.

On 21 November the men of the 'Tiger' Division were ordered to attack the Orscholz Switch Line. Supremely confident in the ability of his division to succeed, the division's commander decided not to use elements of the 90th Infantry Division that had been placed at his disposal and instead attacked alone. He soon realised the error of his ways and reversed his earlier decision, but by the time reinforcements arrived the opportunity of a breakthrough had disappeared and the defences held.

Further to the south the bulk of the 90th and 95th Infantry Divisions managed to cross the Saar River at the start of December and captured a number of pillboxes. This unexpected coup was short-lived. On 16 December Hitler launched his counter-attack in the Ardennes and offensive operations in the Saar were suspended. Operations launched in the north along the Monschau corridor towards the Roer river dams on 13 December were similarly curtailed by Hitler's sudden strike.

For a short time the role of pursuer and pursued was dramatically reversed and the Allies desperately fought to restore their advantage. Of course the situation could have been very different if the Allies had been able to capture a deep-water port earlier in the campaign. The logistical difficulties might have been less constrictive or avoided altogether, giving General Hodges and his corps commanders the confidence to press ahead with their September attacks. Even without this assurance it is arguable whether they could have been more aggressive and taken more of a gamble. Certainly from the German perspective the reticence was perplexing. General Westphal, von Rundstedt's Chief of Staff, reasoned that the Allies had '...overestimated the German strength. Certainly, the permanent fortifications along the West German frontier must have contributed to this judgement, but if the enemy had known their true condition he would hardly have treated them with such respect.'[25]

Not surprisingly, given the difficulty with which they had overcome the fortifications of the West Wall and the casualties they had suffered, the Allies were more effusive in their praise. As Eisenhower noted later, 'The strong artificial defences of the Siegfried Line assisted the enemy to achieve strength in the attack. The obstacles, pillboxes, and fixed guns of that line so greatly multiplied the defensive power of the garrison that the Germans could afford to weaken long stretches of his front in order to gather forces for the counterblow.'[26]

As it transpired, the ill-conceived Ardennes offensive, or the Battle of the Bulge as it was popularly known, was a blessing in disguise for the Allies. It undoubtedly caused a great deal of anxiety in its early days but as the tide of the battle turned it became clear that the German High Command had now used the last of its reserves of men, tanks, ammunition and fuel and that little remained between the Allies and final victory.

24 Whiting, C *The Battle for the German Frontier* (The Windrush Press, Moreton-in-Marsh, 2000), p.14.
25 Westphal, S op.cit, p.176.
26 Eisenhower, D *Crusade in Europe* (Heinemann, London, 1948), p.378.

LEFT **A View of American Techniques for Assaulting Fortified Positions**

In the early days of the battle for the Siegfried Line, US soldiers were struck by the fact that many of the fortifications were unmanned and it was often possible to advance with little or no fighting. However, when the fortifications were manned a set of tactics evolved with which to deal with the bunkers. The first problem was the dragon's teeth. Initially, tankers tried to destroy the teeth with their main armament but this proved to be impracticable, so engineers were tasked with blasting the teeth with TNT but this proved to be too slow and cumbersome (and would have been all but impossible if the teeth had been covered by fire from supporting pillboxes). In the end it was decided that the easiest solution to the problem was to dismantle the steel gates or remove the H beams that were used where the dragon's teeth intersected with roads.

Techniques for handling bunkers had been taught in England and the US but heavy casualties meant that much of the experience had been lost by September 1944. Utilising the many specialist weapons at their disposal (Each infantry battalion was supplied with: 15 Bangalore torpedoes; 15 10lb pole charges; 15 10lb pole charges with beehive; 15 20lb Charges; and 4 Flamethrowers. In addition, they were supported, where possible, by a platoon of light tanks, a platoon of medium tanks and a platoon of M10 tank destroyers) a stage-by-stage approach was developed and adopted by many units.

1: Artillery and mortars firing high explosive shells are used to suppress the pillboxes covering the dragon's teeth, or smoke is fired to obscure the defenders' view. Engineers then blast or dismantle the 'gates' that block the roads.

2: Infantry, engineers and armour move forward, covered by direct fire from artillery and mortars, Once the infantry platoon and engineer sections are in place and the armour in a position to offer direct fire support the barrage is lifted.

3: Tanks, tank destroyers and self-propelled guns engage the pillboxes targeting the apertures and doors. This barrage allows the infantry and engineers to get in close to their target.

4: Following a signal the direct fire is lifted and the assault teams attack covered by fire from men of their own unit. The assault teams use pole charges through the damaged apertures or doors, or pace beehive charges and/or TNT on the roof, to demolish the structure.

5: With the structure destroyed a signal is given (sometimes a coloured flair) to inform other assault teams they can now attack their targets.

With the pillbox destroyed the next in line would be unsupported by interlocking fire and would be attacked from this exposed side. As experience grew it was found to take about an hour to reduce each enemy position.

Unlike their countrymen in the Pacific, the infantrymen in the European Theatre of Operations found flamethrowers to be of little use against pillboxes; the defenders would simply move to another room when under assault by such a weapon.



American military policeman process German POWs as they pass through a section of dragon's teeth. The pristine looking teeth appear to be of the larger type 1939 pattern which were built to counter the development of bigger more powerful tanks. The teeth to the right appear to be originals painted green to merge in with the landscape. (Imperial War Museum)



With the fighting for the Siegfried Line over there was time for a little humour. Sergeant Thompson of the Canadian Army Film and Photo unit hangs washing on the Siegfried Line, March 1945. It had taken six long years to realise the aim of the wartime song. (Canadian National Archives)

At this point it is worth hypothesising as to the outcome of the fighting for the Siegfried Line if the 250,000 men sacrificed in the Ardennes counter-attack had been used to man the western defences. The American GIs on the ground were no mugs. When faced with an occupied bunker they would scout around for an easier route forward and, more often than not, would find one since few of the positions were manned. Had this not been the case the attempts to break the Siegfried Line might have been far more costly than they were – and they were sanguinary struggles in their own right. The advance might also have been considerably slower. Air power was of little use against the heavily fortified and dispersed pillboxes, which meant that each pillbox had to be reduced individually; a time-consuming business. Indeed, if the Siegfried Line had been properly manned it is conceivable that the political map of Europe might have been very different, with the Red Army conquering most of Germany. By mid-December the Allies had breached the Line but were unable to exploit the situation. With the onset of winter the Allied High Command was considering suspending large-scale offensive action and waiting until the spring to resume its attack. The Ardennes offensive changed all that.

In the east the Soviets, by contrast, were making massive strides. In January 1945 the Red Army attacked East Prussia and in February it reached the German border. If the Allies had delayed their offensive, Stalin might have captured most of Germany. It would then have been very difficult to force the Soviet Union to relinquish its hold on this hard-won territory irrespective of the agreements made at Tehran and Yalta.

Conjecture aside, Hitler ignored von Rundstedt's advice and launched the ill-fated counter-attack. The gamble failed and slowly the Allies eliminated the 'Bulge' and smashed their way through the Siegfried Line. Whole sections of the line were unmanned and divisions captured tens, even hundreds of bunkers at a time. Where bunkers were manned they were ruthlessly dispatched using techniques developed in the previous months. Powerful 155mm self-propelled guns, normally used for artillery support, were often brought forward to engage troublesome positions over open sites. The demoralised defenders, with no prospect of relief, usually surrendered. Most of the defences were incapable of taking such punishment, designed as they were to counter weapons of a different age. When the line was built the heaviest French tank gun was the hull-mounted 75mm of the *Char* B1 *bis* and infantry anti-tank weapons were all but unheard of. Infantrymen now roamed the battlefield with the powerful bazooka and sappers were armed with TNT and 'beehive' charges. Technological change, even in such a short period of time, had rendered many of the defences obsolete. Even the newer defences, like the emplaced Panther turrets were unable to stem the Allied tide, although the closeness of the enemy and the lack of materials meant that few were properly installed.

The bleak scenario faced by the German army was in stark contrast to that of the Allies. Fresh recruits replaced losses suffered in the previous fighting and new, more modern equipment arrived, like the M18 'Hellcat' tank destroyer and the British A34 Comet cruiser tank with its 17-pounder gun. Nor were the Allies constrained by the logistical difficulties that had hampered their progress the previous autumn. Nevertheless, it was with more than a little trepidation that the soldiers of the 76th Infantry Division crossed the Sauer river to attack one of the most densely fortified sections of the Siegfried Line along the German border with Luxembourg.

This nervousness might have contributed to the decision to launch a company-sized attack, preceded by a fifteen-minute barrage, against a single pillbox manned by a section of riflemen with two machine guns. In the mêlée that followed the officer leading the attack was hit, as were a number of his men including the individual tasked with depositing the satchel charge of explosives at the bunker door. Despite these difficulties the pillbox was eventually captured and the defenders sent to the cage. The 76th Infantry Division could now put its mind to the more daunting task of how they were going to storm the *Katzenkopf* position that barred its way to the Rhine. The *Katzenkopf* was one of the largest bunkers built by the German engineers and was constructed inside a hill that dominated the small town of Irrel, near Trier. Although not bristling with weapons – one of Hitler's criticisms of such positions – it certainly posed a significant challenge to anyone who was foolhardy enough to attack it, boasting in its arsenal machine guns, a mortar and a retractable flame-thrower.

In light of the previous debacle the men tasked with taking the fort were understandably very nervous. But as events transpired their worries were ill founded. The preliminary barrage was enough to convince the majority of the defenders that there was little point in fighting on and they slipped away into the darkness. Thus the Allies, without a fight had captured one of the most powerful works of the Siegfried Line.

On 7 March 1945 the First US Army captured a railway bridge at Remagen over the Rhine. The positions of the Siegfried Line that were still held were now of little strategic importance and the troops were gradually withdrawn, in spite of Hitler's insistence that every position should be defended to the last. The Siegfried Line had been defeated and Patton's prediction realised, albeit much later than he had anticipated.



Major General Simpson, the commander of Ninth US Army shows the defences of the Siegfried Line to Winston Churchill, the British Prime Minister, Field Marshal Sir Alan Brooke and Field Marshal Montgomery, commander of 21st Army Group, 1945. (Imperial War Museum)

FOLLOWING PAGES **Katzenkopf B Werk**

One of the most interesting features of the *Pioneerprogramm* was the so-called B-Werk (The name originates from the construction thickness 'B'). Thirty-two bunkers of this type were started in the period 1937–38. Each one was different although they did share common features. The entrance was secured with an armoured door behind which, in a throwback to mediaeval castles, was a 3.5-metre deep pitfall. The shelter consisted of approximately forty rooms spread over two or three storeys. As well as the fighting compartments there was a machine room for generating electricity and providing ventilation, a room with a well for water, a kitchen, first-aid room, washroom and toilets and storerooms for food, oil, water and ammunition. The latter were capable of holding sufficient stores to enable the crew to survive independently for thirty days.

On average the bunkers had a crew of ninety men the majority of whom were specially trained to operate the technical equipment and weaponry. This included two machine-guns in each of the six-loophole turrets, a 5cm M19 automatic mortar which could fire 120 rounds per minute and which had a maximum range of 600 metres and a flamethrower which could be rotated 360°. A small cloche was also fitted for observation and target guidance.

One fort worthy of note, not least because it is now a museum, is the *Katzenkopf* or 'Cat's Head' which is situated on the southwest slope of the Katzenkopf Hill overlooking the town of Irrel. The main body of the structure consists of a two-storey construction which accommodated the crew living quarters, sanitary facilities and munitions storage as well as the fighting compartments. From the main body of the structure a stairway descends to two tunnels. The smaller but longer tunnel is linked to a further armoured turret some 75 metres away, while the other larger tunnel leads to a well (although it is believed that it was originally intended as an access tunnel).

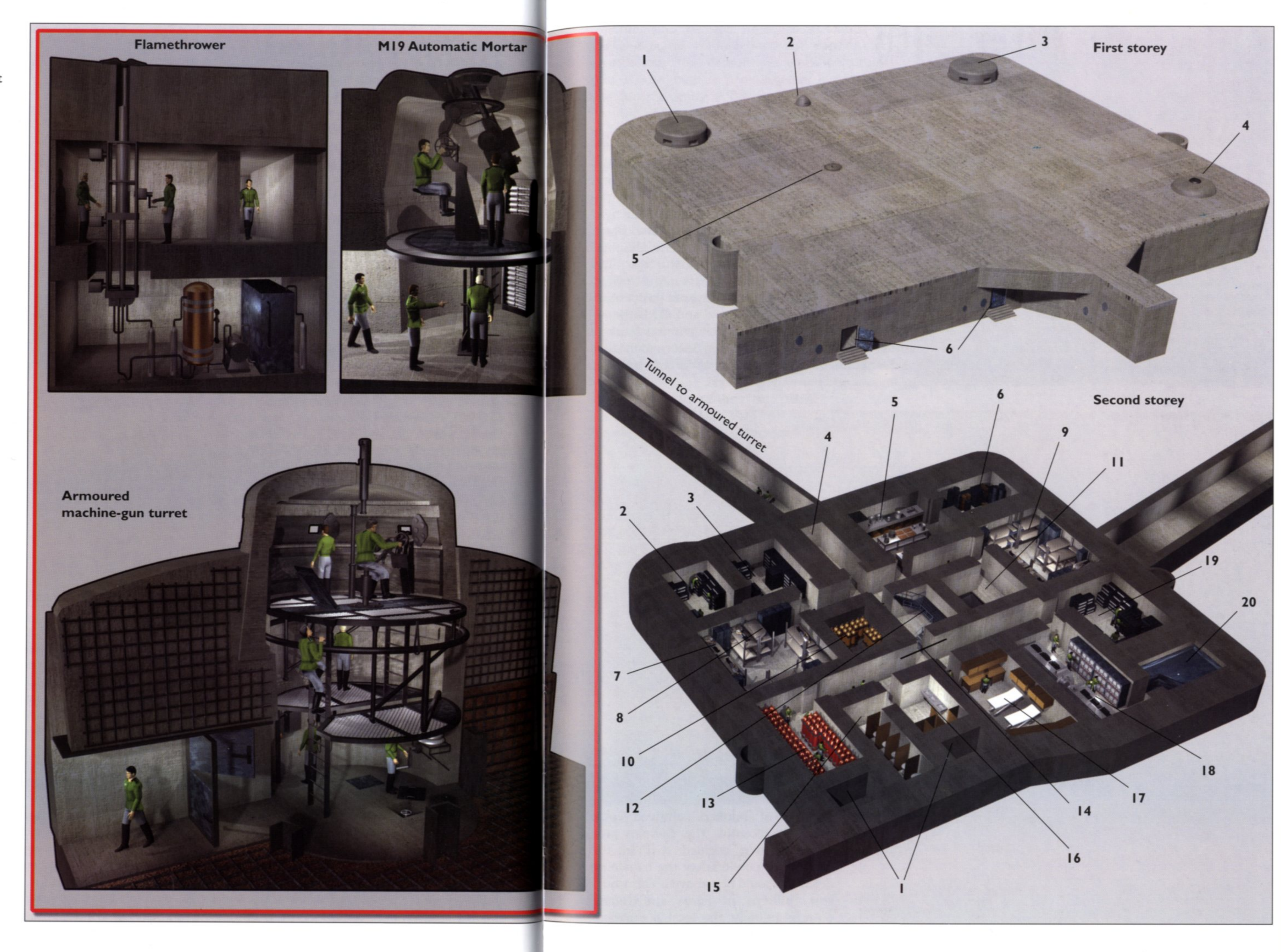
During the fighting for the Siegfried Line it was captured intact by the Americans but after the war was demolished by the French. In 1977 the local fire brigade began excavating the site and although impossible to return to its original state it is open to visitors.

First Storey

1. Armoured turret
2. Small cloche
3. Artillery observation turret
4. Mortar
5. Flamethrower
6. Entrances

Second Storey

1. Pit
2. Ammunition room
3. Ammunition room
4. Entrance to corridor leading to armoured turret
5. Kitchen
6. Provisions store
7. Rest room
8. Corridor
9. Rest room
10. Flamethrower supply room
11. Stair shaft to tunnels
12. Staircase
13. Liquid fuel store
14. Corridor
15. Toilet with wastewater construction
16. Washroom
17. First-aid room
18. Machine room
19. Ammunition room
20. Water store



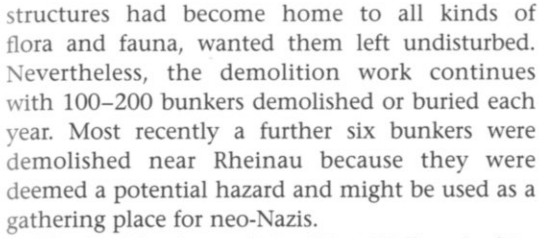
Aftermath

After the war the victorious Allies systematically demolished many of the bunkers and pillboxes of the West Wall. This artillery fort at Kleinau was demolished in November 1948. The 300lb explosive charge completely shattered the structure and dislodged the armour plate. (Public Record Office)

Following the frantic efforts to complete the West Wall, firstly to be ready for the invasion of Czechoslovakia and then the invasion of Poland, its initial contribution to the defence of Germany, in physical terms at least, was very limited. With the defeat of the Low Countries and France, the future of the defences looked bleak. Their work done, the bunkers were locked and much of the equipment and weaponry removed. Unfinished positions were demolished; the remainder were to be maintained to meet any future eventuality, although in truth most were simply abandoned. In the summer of 1944, with the Allies racing across France, it was clear that the defences would face their first true test and, somewhat belatedly, the order was given to renovate the old positions or build new ones. Although far from ready the defences held and the battle for the Siegfried Line continued to rage until February 1945. Countless bunkers were destroyed in the fighting or were demolished by engineers soon after capture; the fluid nature of the fighting meant that it was never clear whether the enemy would recapture an area and reuse the positions.

With the ending of the war in Europe in May 1945 many of the defences were still intact. Indeed, a large number of bunkers and pillboxes in the southern portion of the line had been largely bypassed as the fiercest fighting was concentrated in the area from Cleve down to the Saar. Some of the abandoned buildings were used by the local population – one artillery shelter was used by a local farmer as a cow shed – but many others were destroyed as the British and Americans carried out tests on the structures. Others were simply demolished like the *Katzenkopf*, which was destroyed by the French, or fell victim to the scrap metal drive as armoured turrets, doors and plates were removed and melted down.

As the years passed, more of the defences were buried or demolished as Germany sought to rebuild its shattered economy. But in spite of this and the best efforts of the Allied engineers and scrap metal merchants, a considerable number of bunkers survived until relatively recently. The German government then decided that in the interests of public safety the remaining defences should be removed. This would cost millions of Euros and caused outrage amongst the local population, heritage and military history groups and war veterans. Even environmental groups, recognising that the concrete

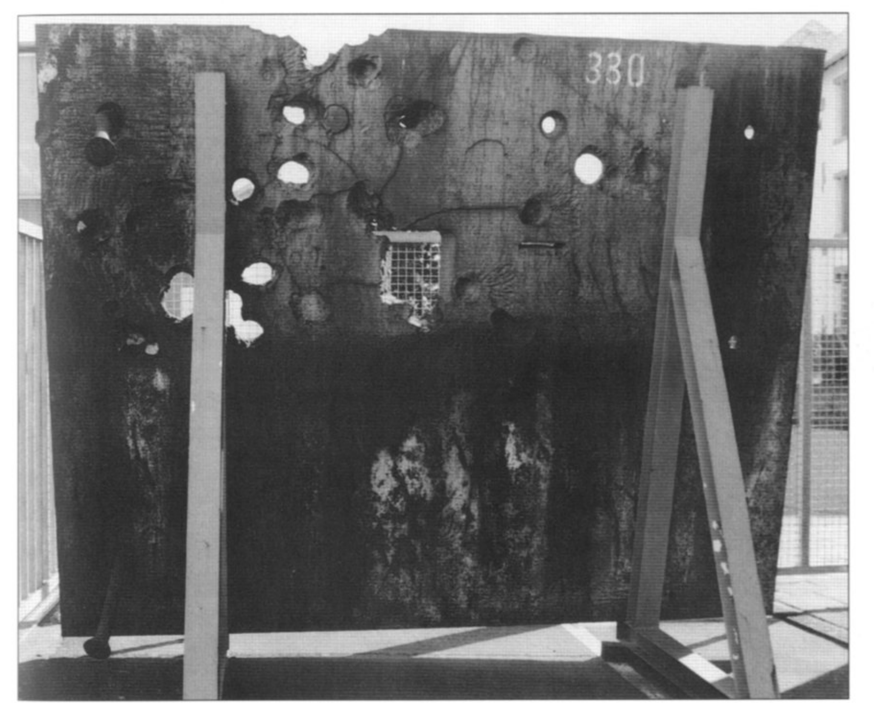


structures had become home to all kinds of flora and fauna, wanted them left undisturbed. Nevertheless, the demolition work continues with 100–200 bunkers demolished or buried each year. Most recently a further six bunkers were demolished near Rheinau because they were deemed a potential hazard and might be used as a gathering place for neo-Nazis.

The fortifications of the West Wall and of its contemporaries represent a watershed in the history of fortifications. Since ancient times the peoples of Europe have built fortifications to protect their borders, but never on such a scale as this. Nor will Europe see their like again. Fortifications have had their day, made obsolete by 'smart' bombs and missiles. The baton of deterrent has now passed to nuclear weapons and 'weapons of mass destruction'. Because of this it is imperative that efforts are made to preserve what little remains of the West Wall, and a number of volunteers have taken it upon themselves to do just that.

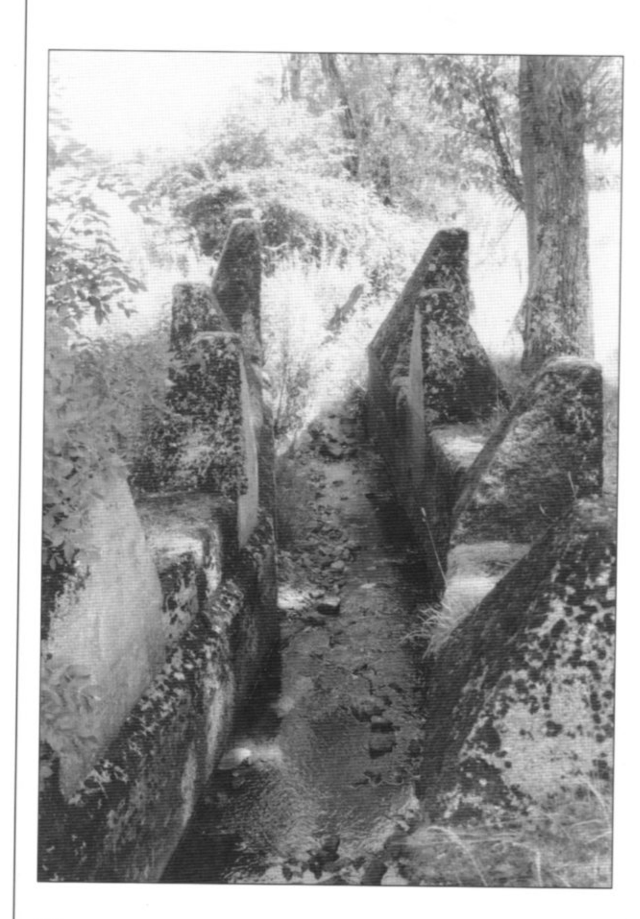


ABOVE Because of their proximity to houses and factories many bunkers could not be demolished with explosives and 'housebreaking methods' had to be used. This bunker at Stolberg, originally disguised as a garage was dismantled in this way in 1948. (Public Record Office)



LEFT Many pillboxes were fitted with thick armoured plates. Through the aperture in the centre an MG08 or MG34 could be fired. The huge bolts that were used to secure the plate to the concrete shelter are still visible. This example was probably used for firing practice and is now on display at the Wehrtechnische Studiensammlung, Koblenz. (Author's collection)

The site today



Where no natural obstacle barred the passage of tanks, engineers constructed rows of concrete anti-tank obstacles, or dragon's teeth. Inevitably, it was necessary to include breaks for roads, tracks and in this case a small stream. This obstacle is still visible and is located near the village of Lammersdorf. (Author's collection)

A number of structures, some in a very poor state, can still be found along the German border. However, many of them are located in restricted areas and as such are not accessible by the general public. Still others lie on private land and should only be visited with the express permission of the owner. Some of the defences are, however, accessible, but are often in a very poor state and are therefore extremely dangerous places. They should be entered with caution. The most easily recognisable and safest part of the defences to visit are the 'dragon's teeth'. Examples of these can be found around Aachen near the villages of Lammersdorf and Roetgen; and between Nonnweiler and Otzenhausen which are to the south of Hermeskeil. Aside from such freely accessible sites a number of museums have been established. Four worthy of note are the Katzenkopf at Irrel, the Westwall Museum at Niedersimten, the Westwallmuseum at Bad Bergzabern and the B-Werk at Besseringen.

Prospective visitors should note that since most of the Siegfried Line bunkers are operated by small local volunteer groups operating on tight budgets, opening schedules can and do change frequently. Consequently, it is always best to try to verify opening times before visiting to avoid disappointment.

Katzenkopf

Perhaps the best known of the Westwall museums is the Panzerwerk 'Katzenkopf' at Irrel. This is one of the last remaining B-Werke (forts) of the West Wall. Demolished by the French after the war, it has been painstakingly restored (in so far as it can be) to its original state.

From Trier head north towards Bitburg and at Helenenberg turn left. As you enter Irrel the museum is to the right and is signposted.

The museum is open from 1 April until 30 September, but because it is reliant on volunteers the opening times are limited to Sundays and Bank Holidays from 2.00pm until 5.00pm. Adults can expect to pay 2 Euros to enter, but there are discounts for groups and children under 16. Guided tours for groups are possible by arrangement.

A word of warning: the bunker has a steady temperature of approximately 10° C so take a jumper!

Relevant website: **www.westwallmuseum-irrel.de**

E-mail: **info@westwallmuseum-irrel.de**

Telephone: 06525 492

Westwall Museum at Niedersimten

The Westwall Museum near Pirmasens has a number of exhibits, displays and vignettes housed in the Gerstfeldhöhe tunnel system.

The museum is in the village of Niedersimten. From Pirmasens follow the signs for Bitche, Niedersimten. Follow the road though the village until you



During the Phoney War the Katzenkopf B Werk was manned by men of the 39th Dusseldorf Fusilier Regiment. This memorial now stands to the memory of the men of this regiment that fell in the Second World War. (Author's collection)

reach the church and then turn left into 'In der Litzelbach'. When driving from France you pass through Obersimten and when you reach Niedersimten you turn immediately right into 'In der Litzelbach'. Limited parking is available immediately outside the museum.

The museum is open from 1 April until 31 October on Saturdays and Sundays from 1.00pm until 5.00pm. Admission is in the region of 4 Euros for adults with concessions for students and children. Guided tours are possible by arrangement at an extra charge. Groups can be accommodated by arrangement.

You should note that, as with the Katzenkopf, the tunnels of the Gerstfeldhöhe remain at a steady 8° C so wrap up warm if you plan to make an extended visit.

Relevant website: **www.westwallmuseum.de/**

E-mail: **info@westwall-museum.de**

Telephone: 06331 46147

For further information write to Günther Wagner, In der Litzelbach 2, 66955 Pirmasens, Germany

Westwallmuseum at Bad Bergzabern

Also in the vicinity of Pirmasens is the Westwallmuseum at Bad Bergzabern. This is housed in the confines of a large bunker (a Regelbau 516).

Bad Bergzabern is located between the city of Pirmasens and Kandel. If travelling from Pirmasens on the B427 when entering Bad Bergzabern take the turning for Annweiler at the roundabout and then take the second turning right into Kurfürstenstrasse. The museum is on the right. The museum is served by a local bus service and picnic area is also available.

The museum is open every first Sunday in the month from 1 March to 30 June from 10.00am until 4.00pm, and from 1 July to 30 September every Sunday. It is additionally open on Easter Sunday and Monday, 1 May, Whit Sunday and Monday and 3 October. Entry for adults is approximately DM 3 with concessions for children and very small children go free. Groups can be catered for by arrangement. All the captions are in three languages: English, German and French.

A book on the bunker is available: *Der Westwall im Bereich Bad Bergzabern*, price DM 22.

E-mail: **westwall@web.de**

Telephone: 06398 367

B-Werk Besseringen

The B-Werk lies between Merzig and Besseringen.

The museum is open on Sundays and Bank Holidays from April through until September from 2.00pm until 5.00pm.

For further information contact the tourist information office in Merzig on 06872 1840

Museum Bunker

Slightly further afield – near Ludwigsburg – and arguably more interesting is a bunker of the Neckar-Enz line built in 1935. It is open every first Sunday in April, July and September from 11.00am until 5.00pm.

Relevant website: **www.neckar-enz-stellung.de**

Between Bous and Schwalbach is another Westwall museum located in Bunker Nr 650. It is well maintained and has a number of interesting exhibits.

For further information write to Edgar Fischer, Bildchenstrasse 2, 66773 Schwalbach-Elm, Germany. Telephone 06834 52191

Other places of interest

For those interested in fortifications the Wehrtechnische Studiensammlung in Koblenz houses a steel plate taken from a West Wall bunker as well as numerous other vehicles and weapons on display. Next door is a superb military bookshop!

For those wishing to travel slightly further afield it is possible to visit the Maginot Line and Fort Eben Emael in Belgium. The former is detailed further in Osprey's Fortress 010: *The Maginot Line 1928–45*.

The historic cities of Aachen and Trier offer good accommodation and are a good base for exploring the West Wall. For the more intrepid traveller, Germany is blessed with a number of excellent camping sites. The site at Stadtkyll lies near the Belgium border between Cologne and Trier. It is in the heart of the West Wall and is within easy striking distance of the Katzenkopf and the defences around Aachen. For those interested in the Battle of the Bulge, the campsite also offers a good base for visiting Malmedy, St Vith and Bastogne. The campsite Buttelwoog, near Dahn is just outside Pirmasens and is well positioned for access to both the Gerstfeldhöhe and the bunker at Bad Bergzabern.



In some of the more major construction projects, like the tunnel system at Niedersimten, it was planned to construct a light railway. Small diesel engines, like the example shown, would transport men and munitions from the delivery point to the fighting positions. (Author's collection)

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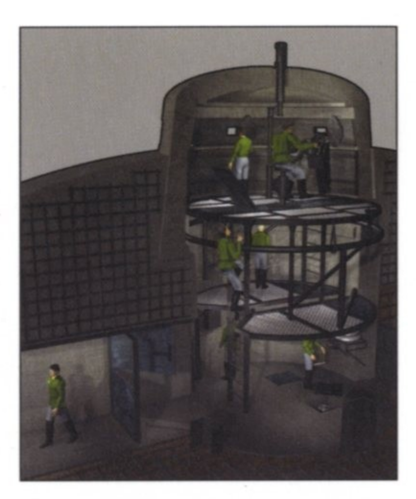
Bunker A small to medium-sized reinforced-concrete defensive structure, often equipped with weapons firing through embrasures
DAF *See* Deutsche Arbeitsfront
Deutsche Arbeitsfront (DAF) German 'Labour Front'. Labour organisation set up to take the place of the labour union system
Embrasure An opening in a wall through which a gun may be fired
Feldkanone (FK) Field gun
Fieldwork A non-permanent fortification, generally constructed from earth and timber, although sometimes reinforced with concrete
FK *See* Feldkanone
Flak *See* Flugzeugabwehrkanone
Flugzeugabwehrkanone (Flak) Anti-aircraft gun
Höckerhindernis Loosely 'dragon's teeth'. Rows of linked concrete obstacles designed to stop tanks
KdF *See* Kraft durch Freude
Kraft durch Freude 'Strength through Joy'. The National Socialist recreational organisation designed to stimulate morale among workers
Luftverteidigungszone West (LVZ West) Air Defence Zone West. A series of defences to the rear of the main West Wall designed to counter the threat to Germany from air attacks, but also to be used as a fallback position if necessary
Organisation Todt (OT) Paramilitary organisation employed in the construction of major state and party building programmes
OT *See* Organisation Todt
PaK *See* Panzerabwehrkanone
Panzerabwehrkanone (PaK) Anti-tank gun
Pillbox British term coined in World War I to describe concrete machine gun shelters which resembled a pillbox
Pionier (Pioneer) German term for engineers
RAD *See* Reichsarbeitsdienst
Regelbau Standard design
Reichsarbeitsdienst (RAD) State Labour Service
Schartenturm Drei/Sechs Cast steel cupola with three or six apertures
Stellung Position or line
Tobruk emplacement Small concrete structure with ring-shaped opening at the top primarily designed to accommodate a machine gun
Trägersperre Obstacle that straddled a road/track which in time of war housed steel 'H' beams to block the enemy advance
Werk Self-contained fort

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References to illustrations are shown in **bold**.

Design, technology and history of key fortresses, strategic positions and defensive systems


Full colour artwork


Cutaway artwork


Photographs


Unrivalled detail

Germany's West Wall

The Siegfried Line

Germany's West Wall, known to the Allies as the Siegfried Line, played a crucial role in the bitter fighting of 1944 and 1945 in North-West Europe. Constructed in the period immediately after the remilitarisation of the Rhineland in 1936, the Wall stretched for 300 miles from Cleve in the north to the Swiss Border and consisted of some 14,000 pillboxes. The Siegfried Line initially blunted the US attack, and Hitler used it as a foundation from which to launch the Ardennes Offensive. This title takes a detailed look at the development and form of this key fortification, examining the principles of its defence in visual depth, whilt also discussing its fate in the wake of the Allied onslaught.

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ISBN 1-84176-678-X

